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JOURNAL OF THE PROCEEDINGS  
OF THE  
LINNEAN SOCIETY OF LONDON.

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On the dermal armour of *Jacare* and *Caiman*, with notes on the Specific and Generic Characters of recent *Crocodylia*. By T. H. HUXLEY, Esq., F.R.S., F.L.S., Prof. of Nat. History, Gov. School of Mines.

[Read Feb. 17th, 1859.]

IN the course of a recent investigation into the nature of the singular extinct reptile, *Stagonolepis*, I was led to inquire somewhat minutely into the character of the exoskeleton, or dermal armour, of the existing *Crocodylia*. To my surprise, I found that very little detailed information on this subject was to be obtained from the standard repertoires of Comparative Anatomy, or even from the special monographs on Crocodilian structure and classification; but I was still more astonished to discover, among whole genera of recent *Crocodylia*, an exoskeleton possessed of characters such as have been universally supposed to be peculiar to long extinct forms of the order, and whose existence in any recent species has hitherto, so far as I can ascertain, been completely overlooked.

The attempt to discover the limits within which this remarkable exoskeleton is to be found, led me to look, more critically than I had previously done, into the arrangement and specific characterization of the recent *Crocodylia*. I have thereby arrived at results which, imperfect as they are, may be of service by leading others to inquire into the exact characters of species not at present within my

reach; and I therefore propose to preface my account of the peculiarities of the exoskeleton in two of the genera of recent Crocodiles with some remarks on the classification of the group, and with a few notes upon the characters of the species and the limits of the genera.

Everyone is acquainted with the great improvement effected in this branch of Herpetology by Cuvier, who divided the Crocodiles, which he regarded as constituting only a single genus, into the three subgenera *Alligatores*, *Crocodili*, and *Longirostres*. Subsequent writers have admitted these highly natural subdivisions; but there has been a constant tendency to raise their rank. The genus *Crocodilus* has become the order *Crocodilia*; the subgenera *Alligatores*, &c., have been elevated into families; Dr. Gray has shown that the *Alligatores* must be divided into three genera, and that there are at least two genera of *Crocodili*; and, while one of Cuvier's species of *Longirostres* has been suppressed, the group is very generally retained with a changed name (*Gavialis*), a very important addition having been made to it in the *Crocodilus Schlegelii* of Müller and Schlegel.

Unless the considerable materials contained in the British Museum, the Hunterian collection, the collection of Dr. Grant, and the Christchurch Museum at Oxford had been freely placed at my disposal, I should have been wholly unable to acquire the information contained in the following pages. It is only right, therefore, that I should take this opportunity of offering my thanks to my friends Dr. Gray, Prof. Quekett, Dr. Grant, and Dr. Rolleston for the many facilities they have liberally afforded me.

The recent species of the order *Crocodilia* are divisible into three families, which correspond with the original subgenera of Cuvier, and may be termed the *Alligatoridæ*, the *Crocodilidæ*, and the *Gavialidæ*.

I. In the ALLIGATORIDÆ the teeth are strong and unequal, and the posterior ones differ greatly in shape from the anterior. The anterior pair of mandibular teeth, and the fourth pair (or the so-called canines) are received into pits in the margins of the premaxilla and maxilla; while the mandibular teeth behind these pass inside, and not between, the maxillary teeth. The mandibular symphysis does not extend back beyond the level of the fifth tooth, and often not nearly so far. The line of the premaxillo-maxillary suture on the palate is straight, or convex forwards. The wide posterior nares look downwards, and are situated forwards on the palate.

This family embraces three genera, readily distinguishable by osteological characters—*Alligator*, *Caiman*, and *Jacare*.

#### Genus 1. ALLIGATOR.

Dental formula,  $\frac{20-20}{20-20}$ . 9th maxillary tooth the largest of its series. The snout is very broad, flattened, and rounded at the end. There is an indistinct longitudinal interorbital ridge; and there are two short ridges along the line of junction of the prefrontal and lachrymal bones. The aperture of the external nares is divided into two parts, by the prolongation forwards of the nasal bones. The supra-temporal fossæ are well-marked and open, though not large. The vomers do not appear in the palate. The feet are well webbed. The dorsal bony scutes are not articulated together; and there are no ventral scutes.

This genus contains only one species, the well-known *Alligator Mississipiensis*, or *lucius*, which is exclusively North American.

Cuvier (Oss. Foss. ed. 4. vol. ix. p. 211) gives the appearance of the vomer in the palate as a general character of the *Alligatores*; but this bone is not visible in the palate of any of those *Alligatores* which Cuvier would have referred to his *A. lucius* or *A. palpebrosus*, and which form the genera *Alligator* and *Caiman* as here defined. The vomers are in fact as slender and delicate as in the Crocodile, and extend only between the level of the tenth maxillary tooth anteriorly and the descending processes of the prefrontal posteriorly.

What may be called the median nares, or the arch formed by the postero-lateral part of the vomer and the anterior and superior lamina of the palatine bone on each side (which would constitute the posterior boundary of the posterior nares, if the palatine and pterygoid bones gave off no inferior or palatine processes), are situated nearly on a level with the twelfth tooth, or with the palato-maxillary suture.

#### Genus 2. CAIMAN.

Dental formula  $\frac{20-20}{22-22}$  (Natterer). The face is without median or transverse ridges, but it is sharply angulated along a line which extends from the orbit forwards along the sides of the snout. The anterior nasal aperture is undivided in the dry skull. The vomers do not appear in the palate. The supra-temporal fossæ are obliterated, the circumjacent bones uniting over them. The webs of the feet are rudimentary. The dorsal scutes are articulated together by lateral sutures and anterior and posterior facets; and there is a ventral shield, consisting of similarly articulated scutes.

Natterer\* has described three species of *Caiman*—*C. palpebrosus*, *C. trigonatus*, and *C. gibbiceps*. The Caimans abound chiefly in tropical South America; but they are found as far north as Mexico, a specimen of *C. palpebrosus* in Dr. Grant's collection coming from that country.

### Genus 3. JACARE.

The snout is broad, and rounded at the end†. Each prefrontal bone is traversed close to its anterior extremity by the ends of a strong transverse ridge, which then curve round and pass forwards on the lachrymal and maxillary bones, to subside opposite the ninth tooth. The anterior nasal aperture is not divided by bone. The vomers, separated by a longitudinal suture, appear in the palate between the premaxillaries and the palatine plates of the maxillaries. The temporal fossæ, though not large, are open. The webs of the feet are small. The dorsal scutes are articulated together, as in the preceding genus; and there are similarly-articulated ventral scutes. There are 18–20 teeth on each side, above and below; and the fourth tooth in the upper jaw is the largest. The mandibular symphysis extends back nearly to the fifth tooth.

In a skull of *Jacare (fissipes?)*, 19 inches long, in the British Museum, I find that part of the vomer which is visible in the palate to be a rhomboidal plate, somewhat truncated anteriorly, and rather more than  $1\frac{1}{2}$  inch long and 1 inch wide. Its anterior end comes within  $\frac{3}{8}$ ths of an inch of the posterior margin of the anterior palatal foramen. Its posterior margin reaches to the level of the eighth tooth. The visible portion of each vomer is only its anterior end, which forms a thick and solid wedge-shaped plate, broader in front than behind, and articulating by a rough anterior and outer face with the premaxilla, by an obliquely ridged posterior and outer face with the maxilla, and by its internal face with its fellow. Its upper, rounded surface projects but little into the nasal passage.  $2\frac{1}{4}$  inches behind its anterior end, the posterior and upper extremity of the vomer passes into a thin and narrow plate of bone, whose plane is at first inclined at an angle of  $45^\circ$  to that of the anterior part of the bone, but gradually becomes vertical; as it does so it deepens, until, 3 inches behind

\* "Beitrag zur näheren Kenntniss der Sudamerikanischen Alligatoren," 'Annalen des Wiener Mus.,' Band i.

† According to Natterer, the dental formula of *J. nigra* and *J. fissipes* is  $\frac{18-18}{18-18}$ , of *J. sclerops*  $\frac{19-19}{20-20}$ , of *J. vallifrons* and *J. punctulata*  $\frac{20-20}{18-18}$ .



the anterior extremity, the vomer is a thin vertical plate of bone,  $\frac{5}{8}$ ths of an inch deep, which articulates below with the palatine plate of the maxilla, and, about 1 inch behind this, with the palatine plate of the palatine bone. The upper edge of this plate nowhere extends to one-third of the height of the nasal chamber. It gives off a horizontal process outwards, which, gradually increasing in width, inclines downwards until it comes into contact, first, with the inner surface of the maxilla, and,  $\frac{3}{4}$ ths of an inch behind this, with the nasal plate of the palatine bone. In front of its junction with the maxilla, the horizontal plate of the vomer presents a long free edge, concave externally; and this bounds the median nares internally and posteriorly. Throughout its junction with the maxilla, the horizontal plate is parallel-sided; but after it joins the palatine bone, it gradually narrows posteriorly, in consequence of the gradual increase in width of the palatine, and ends almost in a point,  $6\frac{1}{4}$  inches behind its anterior end. The posterior edge of the vertical plate is extremely thin, and  $\frac{7}{8}$ ths of an inch deep. It articulates with the anterior end of the vertical plate of the pterygoid, while the straight inferior edge articulates throughout with the palatine plate of the palatine bone. The vomers terminate midway between the median nares and the descending process of the prefrontal. The median nares are bounded entirely by the vomer and the maxilla. They correspond with the nasal face of the palato-maxillary suture, but are rather behind its palatine face, and they are about on a level with the interval between the tenth and eleventh teeth. If the anterior edge of the palatine bone bounded them, they would be a little behind the twelfth tooth. The posterior nares,  $2\frac{1}{8}$  inches wide, by  $\frac{7}{8}$ ths of an inch long, look altogether downwards, are completely divided by a bony septum, and have the form of a rhomboid with its narrowest side posterior. They are surrounded by a strong raised ridge, incomplete only at the anterior and outer angles of the rhomboid.

Five species of *Jacare* are enumerated by Natterer—*J. fissipes*, *J. sclerops*, *J. nigra*, *J. punctulata*, and *J. vallifrons*. They have met with only in South America.

II. In the family of the CROCODYLIDÆ the teeth are usually strong and very unequal in size, and there is always a considerable difference between the anterior and the posterior teeth. The two anterior mandibular teeth are received into pits in the premaxilla; but the canines pass into grooves (which may be converted into fossæ) situated at the junction of the premaxilla and maxilla.

The other mandibular teeth are received between the maxillary teeth. The symphysis of the lower jaw does not extend beyond the level of the seventh or the eighth mandibular tooth. The premaxillo-maxillary suture may be either straight or strongly convex backwards. The divided vomers do not appear in the palate. The posterior nares look more or less backwards, and are transversely elongated. The supra-temporal fossæ are always open, and the feet are distinctly webbed. The dorsal scutes are not articulated; and there are no ventral scutes.

Two genera, *Crocodylus* and *Mecistops*, are distinguishable in this family.

#### Genus 4. CROCODYLUS.

The teeth are always strong and very unequal, the strongest in the upper jaw being the tenth. The mandibular symphysis does not extend beyond the level of the sixth tooth. There are usually six cervical scutes, in two rows, or forming a rhomb, and separated by a distinct interval from the tergal scutes. There are 18 or 19 teeth above, and 15 below, on each side.

##### 1. *Crocodylus vulgaris*.

As Cuvier has remarked, it is extremely difficult to find good distinctive characters for all the species of this genus. My first difficulty was to ascertain the precise characters of that species which has been misnamed *vulgaris*, inasmuch as I could find neither in the British Museum, nor in the Museum of the Royal College of Surgeons, any *authentic* skeleton or skull of this, the so-called Nilotic Crocodile. This difficulty subsisted up to the time that the chief statements contained in the present essay were laid before the Linnean Society; but since then I have been enabled, by Dr. Gray's permission, to examine the skull of a small stuffed specimen, brought to this country from Egypt by Sir Gardner Wilkinson, and to study the splendid entire skeleton of a *Crocodylus vulgaris* in the Christchurch Museum at Oxford, presented to that Institution by the gentlemen who shot it on the Nile, and set up with great care under the auspices of my friend Dr. Rolleston, Lee's Reader in Anatomy and Curator of the Museum. Fortunately the entire skin has been preserved; so that this is the most complete record of the hard parts of any individual crocodile with which I am acquainted, besides being, so far as I am aware, the only authentic entire skeleton of *Crocodylus vulgaris* in this

country. I subjoin the chief points of interest which I noted in my brief examination of this valuable specimen :—

	Inches.
The total length of the skeleton is .....	114
"    "    "    skull .....	16
Between the outer edges of the posterior ends of the quadrate bones .....	$8\frac{3}{4}$
From the snout to the middle of the canine notch...	$2\frac{3}{4}$
Transverse diameter of snout opposite 10th tooth ..	$4\frac{7}{8}$
Long axis of orbit.....	$2\frac{1}{4}$
Short axis of orbit.....	$1\frac{5}{8}$
Interorbital space opposite the middle of the orbit	$1\frac{3}{4}$
Anterior edge of the orbit from end of snout .....	$10\frac{1}{2}$
Syncipital* area in length, about .....	$2\frac{1}{2}$
"    "    in breadth anteriorly .....	$3\frac{3}{4}$
"    "    "    posteriorly .....	4
Supra-temporal fossæ, wide .....	$\frac{7}{8}$
"    "    long .....	$1\frac{1}{8}$
Least width of parietal .....	$\frac{7}{16}$
Total length of mandible .....	$20\frac{1}{2}$
Its greatest depth.....	3
Length of cervical region (or anterior 8 vertebræ) ..	$10\frac{1}{2}$
"    dorso-lumbar region .....	27
"    sacral                "    .....	$3\frac{3}{4}$
Length of humerus .....	$7\frac{1}{2}$
"    ulna .....	$5\frac{1}{4}$
"    fore foot, extreme length .....	6
"    femur .....	$8\frac{1}{2}$
"    tibia .....	6
"    hind foot, extreme length .....	$9\frac{1}{4}$

From the above measurements it will be seen that the skull is somewhat slender. Behind the canine groove it widens to the tenth tooth, which is  $5\frac{3}{4}$  inches behind the end of the snout. It retains about the same diameter to the twelfth tooth, and then slowly widens again,—a sudden increase in size, to the extent of half-an-inch, taking place opposite the posterior margin of the orbit, owing to the flanging-out of the jugal. On the whole, however, there is a slow and even increase in breadth, from the

\* By this term I denote that squarish flat area bounded by the postfrontal and squamosal bones laterally, by the occiput posteriorly, and by a line joining the outer angles of the postfrontals anteriorly.

canine groove to the ends of the ossa quadrata. The nasal aperture is pyriform, its wider end being forwards, and its narrow posterior extremity, into which the pointed ends of the nasal bones project, attaining the level of the first tooth behind the canine groove.

On the left side there is only a pit for the reception of the anterior mandibular tooth, while on the right side this pit is converted into a complete foramen. On the upper face of the skull, the premaxillo-maxillary suture runs vertically upwards through the canine groove, and then passes obliquely backwards to a point 5 inches behind the end of the snout. The anterior part of this suture lies in a strong ridge, which is continued downwards and forwards on the premaxilla to the level of the fifth tooth, a groove separating it from the margin of the nasal aperture. Posteriorly this ridge dies away, but a curved irregular elevation, convex inwards, arises opposite the tenth tooth. It is wholly confined to the maxilla, not extending on to the nasals.

There is a distinct, rough, irregular elevation, bounded on its outer side by a sharp groove, which extends back to the orbit, on the lachrymal bone. The profile of the skull is convex as far as the posterior boundary of the nostril, and very slightly concave from that point as far as the twelfth tooth. It then passes back as a straight, slightly ascending line, only interrupted by the lachrymal ridge, to the margin of the occiput. The inferior margin of the maxilla is convex downwards as far as the canine groove, whose lower end is indicated by a deep sinuation. It then becomes convex again, the crown of the curve being at the ninth and tenth teeth, and its posterior end sweeping into a concavity whose summit is at the twelfth tooth. Behind this the edge of the maxilla is only slightly convex. The inferior contour of the jugal bone is very concave; but the articular end of the quadrate bone descends to the level of the edge of the ninth alveolus.

The orbits have a sort of heart-shape, their apices being turned forwards, and their more convex sides inwards.

The supra-temporal fossæ are half-moon-shaped, their straight sides being external and so inclined that, if prolonged, they would decussate upon a line joining the anterior margins of the orbits.

On the palatine surface of the skull, the premaxillo-maxillary suture runs backwards from the canine groove, as far as the level of the middle of the second alveolus behind the groove (or that of the seventh tooth), which point it reaches at about the junction of the middle with the inner third of the palatine plate of the

maxilla. The suture then turns abruptly forwards until it reaches the level of the anterior margin of the alveolus of the sixth tooth, when it bends suddenly inwards to meet its fellow. The whole suture, therefore, has the form of a W. The vomers are completely hidden.

The posterior nares look downwards and backwards; their aperture is, from the incompleteness of the septum, single, and has a transversely elongated crescentic form. It measures  $1\frac{1}{8}$  inch in width by  $\frac{3}{8}$ ths antero-posteriorly. The basi-sphenoid is seen for about  $\frac{1}{8}$ th of an inch on the base of the skull behind it, bounding the sides of the eustachian tube. The dental formula is  $\frac{18-18}{15-15}$ .

The fourth and tenth teeth are largest in the upper jaw, the first and fourth in the lower. The eight posterior teeth on each side in the upper jaw, and the five posterior in the lower, have a marked constriction between the short crown and the fang of the tooth. There are deep interdental pits for the reception of the mandibular teeth between the third and fourth, and fourth and fifth teeth above, and between the succeeding teeth from the sixth to the thirteenth.

The hyoidean cornua are very strong curved bones, the chord of whose arc measures  $3\frac{1}{2}$  inches. They are concave inwards, convex outwards, concave posteriorly, convex anteriorly; they are flattened from side to side below, but they end above in subcylindrical styloid extremities.

In the ninth vertebra the neurocentral suture passes just above the base of the parapophysis; it traverses the parapophysis in the tenth and eleventh vertebræ, while in the twelfth the parapophysis suddenly rises to the root of the diapophysis, and the suture lies far below it. The centra of the dorsal vertebræ, as far as the thirteenth inclusive, have hypapophyses. The diapophyses of the ninth vertebra pass almost horizontally outwards, but are a good deal inclined backwards. In the succeeding vertebræ up to the fourteenth or fifteenth, the diapophyses are, in addition, inclined upwards, the upward inclination being most marked in the tenth, eleventh and twelfth vertebræ. From the fifteenth vertebra onwards, the transverse processes pass almost directly outwards, without either upward or backward inclination. The span of the transverse processes is greatest in the eighteenth and nineteenth vertebræ, in which the distance between the extremities of these processes is  $7\frac{1}{4}$  inches, a length about equal to that of the longest vertebral rib.

The rib of the ninth vertebra is terminated by a single long and slender semicartilaginous process which does not unite with the

sternum. Each of the vertebral ribs from the tenth to the seventeenth vertebræ inclusively, on the other hand, is united with the sternum, or its continuation, by two such semicartilaginous costal elements, which may be respectively termed sternal and lateral. The sternal elements of the ribs of the tenth and eleventh vertebræ are united with the sternum proper; those of the next five vertebræ are connected with its median backward prolongation, while those of the seventeenth vertebra are attached to the processes into which this prolongation divides posteriorly.

The sternal costal elements are very broad and flat, and though the lateral ones are less so, they are wide and expanded. The lateral costal pieces of the eleventh to the sixteenth vertebræ inclusively, give attachment to very large and flat, triangular, *processus uncinati*. Those of the twelfth are  $3\frac{3}{4}$  inches long and  $1\frac{3}{8}$  inch wide at their widest part. The transverse processes of the twentieth vertebra bear rudimentary ribs. The centrum of the thirteenth vertebra is  $1\frac{3}{4}$  inch long, and the vertebra is  $3\frac{3}{4}$  inches high from the lower edge of the centrum to the summit of the neural spine. The centra of the vertebræ retain nearly the same length to the twentieth caudal; but behind this vertebra they are shorter, as are the anterior dorsal vertebræ. The first caudal vertebra is provided with two styliform bones, which represent the chevron bones of the other caudal vertebræ, but are not united below.

The dorsal scutes have the arrangement which has often been described. They are separated (except perhaps the median rows) by integumentary spaces, neither overlapping nor uniting by sutures; and there are no ventral scutes.

Among the osteological characters which have been detailed, the peculiarities of the tergal armour, the proportions of the skull, combined with the characters of the ridges upon its surface, and the form of the premaxillo-maxillary suture amply suffice to diagnose this species. Even in the small skull, only  $5\frac{1}{2}$  inches long, lent to me by Dr. Gray, the characteristic features of the species are well exhibited, although age appears to give rise to many differences. Thus the posterior margin of the external nostrils does not extend so far back as in the adult, and the facial is smaller in proportion to the syncipital region, whose anterior and posterior transverse dimensions are very nearly equal. The orbits are proportionally larger, the interorbital space more excavated; and the outer straight margins of the supratemporal fossæ are parallel with the longitudinal axis of the skull. Still more important differences

are visible on the palatine face of the skull. The premaxillo-maxillary suture reaches back, indeed, to the line of the seventh tooth; but it forms an even curve whose summit is in the middle line. The aperture of the posterior nares, again, has a totally different form from that which it assumes in the adult. It is somewhat heart-shaped, with its apex forwards, measures  $\frac{1}{4}$  inch long by  $\frac{3}{16}$ ths at broadest, and looks altogether downwards, while its anterior margin is situated far more forward in the palate than that of the adult.

## 2. *Crocodilus biporcatus*.

This, the best-known Crocodile, is a very well-marked species, characterized (beside the peculiarities of its dermal armour) by a comparatively slender skull, similar in shape to that of *C. vulgaris*, and, like it, without any sudden enlargement immediately behind the canine groove; and by the strong ridge which arises on each lachrymal bone close to the anterior edge of the orbit, and is continued forwards on to the line of junction of the nasal and maxillary bones, so that the naso-maxillary suture traverses the axis of the ridge, and then curves outwards, descending towards the alveolus of the tenth tooth. The premaxillo-maxillary suture is W-shaped; and its salient angles reach backwards even to the level of the posterior margin of the seventh alveolus.

## 3. *Crocodilus Americanus (acutus, Cuv.)*

has the slenderness of snout (even more marked) and the form of the premaxillo-maxillary suture of the preceding species; but it is at once distinguished from this and all other Crocodiles (except *C. rhombifer*) by the marked longitudinal and transverse convexity of the middle of the face, which gives the profile a totally different aspect from that of the other species, which are flat or concave in this region.

## 4. *Crocodilus Journei*

is another unmistakeably distinct and very remarkable species. The descriptions and figures given by Graves, Bory de St. Vincent, and Duméril and Bibron, of the unique specimen of this Crocodile in the Bordeaux Museum, would alone have compelled me to differ entirely from the view taken by Dr. Gray of the affinities of this species. These observers agree in stating that *Crocodilus Journei* has six cervical scutes, arranged as in the other Crocodiles, and, as Graves says, "separated by an interval of four inches" from the commencement of the tergal scutes, whence it is obviously impos-

sible that it can be a *Mecistops*. But, in addition to this, I had the good fortune to find, among the recent additions to that excellent osteological collection which Dr. Gray has gradually formed at the British Museum, the skull of a Crocodile obtained from a dealer in Paris, and labelled by him "Croc. de l'Orinoko." I at first imagined this Crocodile to be a *Mecistops*; but on careful investigation it turned out to be no other than the skull of a *Crocodilus Journei*, somewhat larger than the Bordeaux specimen, but, as the subjoined measurements will prove, agreeing with it in all its proportions:—

	Inches.
Length from end of snout to end of ossa quadrata...	22 $\frac{1}{2}$
Breadth between outer margins of ossa quadrata ...	9 $\frac{3}{4}$
—— at the level of the anterior margins of the orbits .....	5 $\frac{1}{2}$
—— at the tenth tooth .....	3 $\frac{1}{2}$
—— at the end of the snout .....	2 $\frac{3}{4}$
—— of the interorbital space .....	1 $\frac{3}{4}$
Length of mandibular symphysis .....	5

Now Duméril and Bibron expressly state that the length of the head of *C. Journei* equals 2 $\frac{1}{2}$  times its greatest transverse diameter, that the width of the jaws at the anterior margins of the orbit equals one-fourth the length of the head, and that at the tenth tooth it equals one-sixth the length of the head; and these are as nearly as possible, it will be observed, the relations of the same dimensions in the above list.

In the specimen in the British Museum there are eighteen teeth on each side above, and fifteen below. The Bordeaux specimen is stated to have the same dental formula, except that there are sixteen teeth in the left ramus of the mandible. The fourth and tenth maxillary teeth are stated by Graves to be as large again as the others; and the corresponding alveoli have these proportions to one another in the British Museum specimen. In fact, there can be no doubt that this skull is that of a true *Crocodilus Journei*.

But its general characters at once prove the close affinity of *C. Journei* with the other true Crocodiles, from which it differs only in its elongated and gradually tapering skull, and in the more backward extension of the mandibular symphysis\*, which attains the level of the posterior margin of the sixth tooth.

In this character, and in the extreme slenderness of the snout,

\* The greater proportional length of the symphysis is noted by Duméril and Bibron.



there is doubtless an approximation to *Mecistops*; but *Crocodilus Journei* is sharply separated from that genus by the characters of its teeth, and by those of its dermal armour.

5. *Crocodilus bombifrons* (*palustris*?).

All the species of *Crocodilus* which I have hitherto mentioned have, in common, the backward curvature of the premaxillo-maxillary suture to the level of the seventh tooth. But there is a species of Crocodile, about whose proper specific name I am by no means clear, in which this suture passes straight across the palate, or may even be a little convex forwards.

And not only do the skulls of this species exhibit this approximation to those of the *Alligatoridae*, but they resemble them still further in their rounded snouts, their great width immediately behind the canine groove, and in the fact that, in young specimens, one or the other canine may be received into a pit instead of into a groove\*.

In the Hunterian Collection there are seven skulls, varying in length from  $5\frac{1}{4}$  inches up to 16 inches, in none of which does the crown of the premaxillo-maxillary suture extend beyond a line joining the sixth pair of teeth. In all there are two short ridges (convergent in young specimens, nearly parallel in old ones) upon the lachrymal bones, which end before reaching the anterior limits of those bones. They all have an oblique ridge on the upper jaw above the tenth tooth; and the snout attains the width which it has opposite this tooth immediately behind the canine groove. In the British Museum there are five middle-sized skulls with the same characters; but two of these have a pit on one side of the upper jaw, and a groove on the other, and one has something between a pit and a groove on each side.

Dr. Gray, has in his 'Catalogue†,' mentioned the peculiar transverse disposition of the premaxillo-maxillary suture in his *Croco-*

\* In a skull of this species  $14\frac{1}{2}$  inches long, in the British Museum, the vomers are completely excluded from the palate, and their anterior ends do not extend for an eighth of an inch beyond the palatine part of the palato-maxillary suture, which lies on a level with the anterior margin of the twelfth alveolus. Each vomer is  $2\frac{3}{8}$  inches long, and presents the same general form as that of *Jacare*; only the anterior division is but a very small, flat and thin plate, not a quarter of an inch long. The boundary of the median nares is formed in equal proportions by the vomer and the palatine, and is opposite the fourteenth tooth. The hinder end of the vomer articulates with the end of the descending process of the prefrontal.

† 'Catalogue of the Tortoises, Crocodiles, and Amphisbænians in the Collection of the British Museum,' 1844, p. 59.

*dilus bombifrons*; and on examining the two crania thus named in the British Museum collection, one of which is 20 and the other 21 inches long, I can discover no distinguishing character between them and those already described. There can be no doubt then, I think, that these constant and well-marked characters, exhibited by fourteen skulls which vary in length from  $5\frac{1}{2}$  to 21 inches, prove the existence of a distinct species of Crocodile, which I would provisionally term *bombifrons*.

I believe that this species has been constantly confounded with *biporcatus*, from which it may be at once distinguished by the direction of the premaxillo-maxillary suture, and by the shape of the snout behind the canine groove. I have found these distinctions to hold good at all ages; but the last-mentioned difference is far more marked in middle-aged than in either young or old specimens.

All the skulls named *Crocodilus palustris* which I have seen are referable either to *C. biporcatus* or to *C. bombifrons*. With respect to the *C. palustris* of Lesson and Duméril and Bibron, the latter authors consider it to be only a variety of *C. vulgaris*. Their description would, however, apply very well to *C. bombifrons*, as I have defined it above; and they expressly state ('Erp. Générale,' t. iii. p. 113) that all their specimens (twelve in number and varying in length from 30 centimetres to more than 3 metres) came from the East Indies or the Seychelle Islands. Now, Duméril and Bibron enumerate only three Asiatic Crocodiles—*C. biporcatus*, *C. palustris*, and *C. galeatus*, the last of which was only known to them by description; so that all the numerous Asiatic crocodiles which passed through their hands belonged either to *C. biporcatus* or *C. palustris*. On the other hand, all the skulls of crocodiles from Asia which I have met with (amounting to at least twenty) are either those of *C. biporcatus* or of the species which I have called *bombifrons*; so that I suspect the latter title will turn out to be a synonym of *palustris*.

#### 6. *Crocodilus rhombifer*.

I have not been able to obtain any skull of this species, which, according to Cuvier's account and figures ('Oss. Fossiles,' t. ix. p. 102), resembles *C. Americanus* in the great convexity of its nasal region, but differs from it in the greater breadth of the skull, and in the strong converging preorbital ridges, which appear to be limited to the lacrymal bones. If the figures are to be trusted, however, there are other very important distinctive characters

about the cranium of this species; for Cuvier's, fig. 2, pl. 331, which gives a view of the palate, shows the premaxillo-maxillary suture forming a nearly straight transverse line.

There remain several species of *Crocodylus* whose skulls I have not been able to examine, and of which no sufficient descriptions exist. Of these, (7.) *C. galeatus* and (8.) *C. Gravesii* (*planirostris*) would appear to be very distinct forms. (9.) *C. marginatus* is considered by Duméril and Bibron to be only a variety of *C. vulgaris*; and they take the same view of (10.) *Crocodylus suchus*. Professor Owen, however, has figured the cranium of an Egyptian mummy under this name ('Monograph on the Reptilia of the London Clay,' Pal. Soc., 1850). In the under-view of this skull (tab. i. fig. 2), the junction of the premaxilla and the maxilla in the palate seems to be broken away; but on the left side, the palatine process of the maxilla is entire, as far as the level of the anterior margin of the sixth tooth, and there is not a trace of a suture behind this point. Are there, then, two or more species of Crocodile in Egypt, as Geoffroy St.-Hilaire supposed?

With regard to the distribution of the species of *Crocodylus*, *C. vulgaris*, *C. marginatus*, and *C. suchus* (?) appear to be exclusively African; all the crocodiles from other parts of the Eastern hemisphere, which I have met with, belong, as I have stated above, either to *C. biporcatus* or *C. bombifrons*, both of which species are found in the Ganges. *Crocodylus galeatus* appears to be peculiar to Siam. *Crocodylus Americanus* and *C. rhombifer* are undoubtedly American. *C. Journei* has been supposed to be African; but such positive evidence as exists tends rather to prove it to be an American species. Thus Bory de St. Vincent states that the Bordeaux specimen is "suspected to have come from America;" and, as I have said, the skull in the British Museum is labelled "from the Orinoko."

*Crocodylus Gravesii* (*planirostris*) is supposed by Bory de St. Vincent to have been brought from the Congo; but its real origin is not known.

#### Genus 5. MECISTOPS.

The cranium is elongated, and the snout slender and Gavial-like. There are eighteen slender and subequal teeth above, and fifteen below, on each side. The mandibular symphysis extends back to the level of the seventh tooth. The cervical scutes are arranged in two transverse rows, each of which contains two scutes; and there is no space left between the posterior row and the tergal series.

This excellent genus, as established by Dr. Gray, includes Cuvier's *Crocodilus cataphractus* (which Dr. Gray considers to be the young of a species whose full-grown form was discovered by Mr. Bennett in West Africa), *Crocodilus Journei* and *Crocodilus Schlegelii*. As I have endeavoured to show, however, *C. Journei* is a true crocodile; and, as I shall point out below, Müller and Schlegel have satisfactorily proved *C. Schlegelii* to be a Gavial. Consequently *Mecistops* is at present represented by only one species, which must be called *M. cataphractus* if *M. Bennettii* of Gray is really the adult of the form which Cuvier described.

III. In the family of the GAVIALIDÆ, the snout is always very long and slender; the teeth are for the most part slender, sharp-edged, and subequal. The two anterior mandibular teeth pass into grooves, one of which lies on each side of a beak-like prominence of the premaxillæ, which carries the two anterior upper teeth. The canines are received into grooves. The mandibular symphysis extends back to at least the fourteenth tooth, and is partly formed by the junction of the splenial bones. The premaxillo-maxillary suture is always strongly convex backwards. The posterior nares are situated more forward than in the *Crocodili*. The temporal fossæ are large. The feet are strongly webbed. The dorsal scutes are not articulated; and there are no ventral scutes.

I distinguish two genera in this family, *Rhynchosuchus* and *Gavialis*.

#### Genus 6. RHYNCHOSUCHUS.

There are twenty teeth above, and eighteen or nineteen below, on each side; the mandibular symphysis extends to the fifteenth tooth. The posterior teeth of the upper jaw, and almost all those of the lower jaw, are received into interdental pits; the orbital margins are not raised; and the premaxillæ are hardly at all expanded. The premaxillo-maxillary suture does not reach the third tooth behind the notch.

I propose the name *Rhynchosuchus* to indicate that generic type which is at present represented by the solitary species called by Müller and Schlegel *Crocodilus (Gavialis) Schlegelii*, and admirably described and figured by them in their essay, 'Over de Krokodilen van der Indischen Archipel,' in the 'Verhandelingen over de natuurlijke Gesch. der Nederl. overzee. Bezittingen,' 1839-1844. Under the title *Crocodilus (Gavialis) Schlegelii* (p. 18), they say—"The Gavial from Borneo, when compared with

the Indian one, is principally distinguished by the following characters :—

- “ 1. By its stronger form and better developed limbs.
- “ 2. By its much less slender head and snout, which last does not narrow so suddenly in front of the eyes as in *G. Gangeticus*.
- “ 3. By the smaller number of teeth, of which there are twenty above and eighteen below on each side, while *G. Gangeticus* has  $\frac{28}{26}$  or  $\frac{27}{25}$ ; furthermore, the teeth are stouter, less curved, and less sharp, and are disposed more perpendicularly, and the ninth tooth of the upper jaw (reckoning from the front) is considerably larger and stronger than the others; whence it follows that, just as in the true Crocodiles, the snout at the level of this tooth exhibits a lateral projection.
- “ 4. By the shorter symphysis of the under jaw.
- “ 5. By the absence of the swollen nasal prominence (neus-*klep*), which characterizes the Gangetic Gavial.
- “ 6. By the less expanded form of the tabular upper surface of the hinder part of the skull.
- “ 7. By the very slight production of the edges of the orbit.
- “ 8. By the large eyes.
- “ 9. By the presence of a number of small nuchal shields, while *G. Gangeticus* has but one pair.
- “ 10. By the strongly developed keels of the dorsal scutes.
- “ 11. By the much larger scales on the under parts and on the legs of the animal.
- “ 12. By the different colours with which it is variegated.”

These authors further point out that the vomers appear for a small space in the posterior part of the palate, that the opercular or splenial bones join in the symphysis of the lower jaw, and that the cervical and dorsal scutes form one continuous shield; and they represent the two anterior mandibular teeth passing in grooves on either side of the end of the premaxilla. In fact, they fully and completely establish the fact that their new species belongs to the *Longirostres* of Cuvier, or to the Gavials of later writers.

Under these circumstances, it is somewhat surprising to find the deliberate conclusions of these careful investigators set aside in the following brief passage :—

“ This Bornean species (*C. Schlegelii*) was, in fact, originally described as a new species of Gavial; but the nasal bones, as in the fossil from Sheppey, figured in t. ii. 15, extend to the hinder

border of the external nostril.”—Owen, *Fossil Reptilia of the London Clay, Crocodilia*, p. 15: 1850.

Müller and Schlegel give remarkably clear and beautiful figures of the skull of their Gavial; and these show at once that the nasal bones do not “reach the hinder border of the external nostril,” but meet the premaxillaries at a point very distant from that border, viz. opposite the ninth tooth. Even did the nasal bones reach the posterior boundary of the nostril, such a character would not outweigh those derived from the relations and number of the teeth, the structure and extent of the mandibular symphysis, and the disposition of the dermal scutes,—all of which are so clearly and definitely set forth by Müller and Schlegel, that it seems difficult to understand how any one who had consulted the original memoir could have overlooked them.

It was possible, however, that Müller and Schlegel, notwithstanding their great opportunities, might have erred in their statements; and I therefore gladly seized the opportunity of testing their description by comparing it with an authentic skull of the species in question, from New Guinea, in the collection of the British Museum.

I have found the statement of Müller and Schlegel minutely accurate in almost all points; and there cannot be the slightest doubt, not only that the Schlegelian crocodile is one of the *Gavialidæ*, but that it forms a distinct generic type in that family, as different from *Gavialis* as *Caiman* is from *Jacare*, or *Mecistops* from *Crocodilus*.

The following are the most important measurements of the skull of *Rhynchosuchus Schlegelii* in the British Museum collection:—

	Inches.
Length from the end of the premaxilla to that of os quadratum.....	23
Breadth from outer edge of one os quadratum to that of the other .....	$8\frac{3}{4}$
Breadth across the face in front of the orbits .....	4
„ at the 9th tooth .. . . . . .	2
„ at the 5th tooth .. . . . . .	$1\frac{1}{2}$
„ at the 3rd tooth .. . . . . .	$1\frac{3}{4}$
„ of the beak-like curved process which carries the two anterior teeth .....	1
Mean width of lower jaw from symphysis to extremity .....	$1\frac{5}{8}$

	Inches.
Length .....	12
No tooth measures transversely more than .....	$\frac{5}{16}$

The face is very smooth; but a slight longitudinal groove runs down on each side from the anterior margin of the orbit for about two inches. Anteriorly to this point the snout retains a nearly even diameter as far as the ninth tooth, in front of which it suddenly narrows a little, retaining nearly the same dimensions to the fourth tooth, where it widens a very little, and then suddenly narrows to the terminal beak. The lower jaw does not expand at all at its extremity. The nasals join the premaxillaries opposite the ninth tooth, and the splenial bones, in the lower jaw, end opposite the tenth mandibular tooth, as the figures of Müller and Schlegel show. The vomers appear between the inner edges of the palatines posteriorly, as a thin bony band  $1\frac{3}{8}$  inch long by  $\frac{1}{8}$  inch wide, which tapers at each end and is divided by a longitudinal suture. The ninth tooth of the upper jaw is stronger than the rest.

The only point in which the description of Müller and Schlegel seems to me to be incomplete\* is with regard to the disposition of the teeth. They say—"The teeth of *C. Schlegelii*, as regards their form and development, more nearly resemble those of the true Crocodiles; but in the way in which the teeth of the two jaws are opposed, there is the most complete resemblance between our species and the Gangetic Gavial,—both which species differ from all other crocodiles in the circumstance that when the mouth is shut, all the teeth of the under jaw project outside the lateral margin of the upper jaw" (*l. c.* p. 22).

What I find is this:—The anterior teeth of both the upper jaw and the mandible are long, slender, sharp-edged, and slightly curved. The posterior eleven, on each side, in the upper jaw, are short, straight, conical, and constricted below their crowns. There are deep interdental pits between the ten posterior mandibular teeth, into which the opposed teeth of the maxilla are received when the jaws are closed. All the mandibular teeth, except the two anterior and the fourth pair, pass into like pits in the upper jaw. The anterior eight teeth on each side of the upper jaw pass straight down outside the lower jaw. In the Gangetic Gavial the relations of the teeth of the two jaws appear to me, as I shall state below, to be very different.

\* Or it is possible that the *Rhynchosuchus* from New Guinea, which I have examined, is specifically distinct from the Bornean form.

*Rhynchosuchus Schlegelii* inhabits the inland lakes of Borneo, and is found in New Guinea.

Genus 7. GAVIALIS.

There are twenty-seven or twenty-eight teeth in the upper, and twenty-five or twenty-six in the lower jaw. The mandibular symphysis extends to the twenty-third or twenty-fourth tooth. The lateral teeth of both jaws are, all but the very hindmost, directed obliquely downwards (or upwards), forwards or outwards, and are not received into interdental pits. The anterior margins of the orbits are raised. The premaxillæ and the end of the mandible are greatly expanded. The premaxillo-maxillary suture reaches the level of the fourth tooth behind the canine notch.

The only true *Gavialis* is the well-known *G. Gangeticus* from the East Indies. In this 'Gavial,' or 'Garrhial,' the vomers are slender bones which do not extend further forwards than the level of the twenty-second or twenty-first tooth, and have but a very short and slender representative of the anterior flattened division of the bone in *Jacare*; posteriorly they extend back to the level of the descending processes of the prefrontals. In a skull 25 inches long the vomers have a length of about 4 inches, extending as they do a little further forward than the palato-maxillary suture. The median nares are opposite the twenty-fifth tooth.

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All the *Crocodylia* which I have enumerated are provided with two perfectly distinct kinds of dermal armour,—the one consisting of plates of horn, produced by a modification of the superficial layer of the epidermis; the other composed of discs of bone marked by a peculiar pitted sculpture on their outer surfaces, and developed within the substance of the dermis. To the former I shall apply the term "scales;" the latter are what I have denominated "scutes."

All recent *Crocodylia* have both scales and scutes in the dorsal region of the body, the scutes underlying, and having the same general form as, the scales. In all, the ventral region of the body is also covered with scales which have a very definite shape; but in no recent Crocodylian which I have examined, save those species which are included in the genera *Caiman* and *Jacare*, are there any scutes in the ventral region.

Again, in the genera *Alligator*, *Crocodylus*, *Mecistops*, *Rhynchosuchus*, and *Gavialis*, the edges of the scutes, except those of the two median longitudinal rows, are hardly ever united by sutures,



nor do the posterior margins of those in each transverse row overlap the anterior margins of the succeeding row. At any rate, there is no flat, bevelled, articular facet on the outer surface of the anterior margin of a scute, for articulation with the inner surface of the posterior margin of its predecessor. In the genera *Caiman* and *Jacare*, however, the lateral edges of all the scutes of the dorsal and ventral shields are united by serrated sutures; and the anterior end of the outer face of each is provided with a well-marked smooth facet, which is overlapped by the smooth under-surface of the scute in front of it.

I first noticed the remarkable structure of the dermal armour of these *Alligatoridæ* in the skin of a *Jacare* (*sp. incerta*), wanting the end of the tail, but which must have belonged to an animal between five and six feet in length. It had long been in my possession; but I had never before had occasion to study its characters minutely.

The horny scales, which had the appearance of thin tortoise-shell, could be readily peeled off (especially by the aid of a little caustic potash); and then the white surface of the subjacent bony scute upon which they were modelled came into view. It is to be understood, however, that the inner surface of the scale corresponded only in its general form with the outer surface of the scute; for it did not dip into the pits with which the latter is sculptured. These are in fact filled by the dry dermis which extends over and encloses the scute, a very thin layer (bearing the rete mucosum) being interposed between it and the scale; so that the pitted sculpture does not come out well until the scutes have been boiled.

The *dorsal* scutes are both carinated and angulated. By the application of the former term, I mean to indicate that, along a median or submedian longitudinal line, their substance is more or less elevated, so as, in many cases, to form a very prominent crest. This crest always subsides before it reaches the anterior margin of the scute, though it may extend beyond the posterior margin. Its highest point is always behind the centre of the scute, and is devoid of sculpture. The sculpture however seems to radiate from this point, inasmuch as it consists, on the greater part of the scute, of distinct pits, which are usually round towards the centre, but towards the periphery become ovals with their long axes directed towards the point in question.

The smooth inner surfaces of the scute shelve towards a depression which corresponds with the external ridge, under which the

sides of the scute seem to meet in an angle. This may be called the 'angulation' of the scute. From before backwards, the inner surface of the scute is a little convex. The scute is thickest in the middle; posteriorly, it thins off to an edge and overlaps its successor; anteriorly, its outer surface is bevelled off at an acute angle with the inner, so as to give rise to a smooth shelving surface—wide from side to side, narrow from before backwards—forming the 'articular facet,' which is overlapped by the inner surface of the posterior edge of the preceding scute. I have termed this the 'articular facet;' but it must not be supposed that there is anything like a true joint between the opposed facets of the overlapping and overlapped scutes; on the contrary, they are at once separated and connected by the dermal connective tissue.

The posterior margin of the articular facet is separated by a deep transverse groove, divided by little partitions into as many pits, from the rest of the sculptured surface; but there is no trace of any suture dividing the scute into two portions. The lateral margins of each scute are united by serrated sutural edges with those which lie next to them in the same transverse row; so that each row forms a nearly solid flat bony bar, composed, in the middle of the back, of as many as ten distinct scutes. The outer edges of the outermost scutes only, thin off and exhibit no sutural serration, inasmuch as they are not directly connected with any other scutes.

The median line of the back corresponds in general with the suture between the two middle scutes of each transverse row; so that the scutes are disposed symmetrically on either side of that line. Furthermore, the anterior part of the inner surface of each of the two middle scutes is connected by ligament with the extremity of the spinous process of a vertebra; at least, this is the case in the dorsal, lumbar, sacral, and anterior caudal regions.

The scutes which protect the *ventral* side of the body, from the throat backwards, are four-sided and similar in their ornamentation to the dorsal scutes; but they exhibit neither ridge nor angulation, their outer and inner surfaces being parallel, and either nearly flat or evenly curved. Each forms, in fact, a segment of a large cylinder, inasmuch as the whole ventral shield is convex transversely, being nearly flat in the middle and much bent up at the sides. The dorsal shield, taken as a whole, is, on the contrary, nearly flat. The lateral edges of the ventral scutes interlock suturally; and their anterior and posterior edges are overlapped and overlap, just like the dorsal scutes. The outer edges of the

outermost ventral scutes thin off and are not united with any bony element; and the ventral, like the dorsal scutes, are usually arranged symmetrically on either side of the median sutural line. There may be as many as twenty-two scutes united by their lateral sutures into a single strong, curved, transverse, bony, bar-like segment of the ventral armour.

Throughout the neck and body, and as far as the commencement of the tail, the ends of the dorsal and ventral bony bars, whose sum may be regarded as a dorsal and a ventral shield respectively, are separated by an interval of integument, in which only small scattered scutes are visible. The physiological import of this arrangement becomes obvious when we consider in what manner the animal breathes; and indeed the integumentary interval answers very precisely to the leather which connects the two boards of a bellows. Again, though the limbs are themselves covered with articulated scutes, they are afforded free play upon the body by this flexible interspace. Immediately behind the hind legs, the ventral and dorsal shields unite; and the tail is from that point surrounded by a succession of bony hoops, each of which corresponds with a vertebra, the segments of the exoskeleton answering to those of the endoskeleton.

The most remarkable feature about the ventral scutes, however, and that in which they differ most widely from the dorsal ones, consists in the fact that each scute is composed of two distinct pieces, an anterior and a posterior, which unite together by a transverse serrated suture. The anterior piece or 'semi-scute' may attain to three-quarters the length of the posterior, and it has exactly the same width. The anterior semi-scute bears the articular facet and the transverse pitted groove, whose posterior wall is just in front of its hinder edge, or in other words, of the suture, when the two semi-scutes are united.

Such are the general characters and mode of arrangement of the dorsal and ventral armour of *Jacare*. But there remain many noteworthy peculiarities in the disposition and number of the components of each band of the armour.

Thus, in the *dorsal shield* there are two rows of nuchal scutes, each containing eight separate keeled bony plates; and of cervical scutes there are five rows, the two anterior of which contain four angulated and carinated scutes each, while the three posterior contain only two scutes each. All these scutes, except the anterior row, have articular facets; and all those of each row are united suturally. Of dorsal scutes there are thirty transverse rows up to

the median keel of the tail, which commences with the thirty-first row. The number of scutes in each row is as follows :—

Rows.	Scutes.	Rows.	Scutes.
1, 2, 3, 4 .....	6	25, 26.....	5
5, 6, 7, 8, 9, 10, 11	10	27, 28 .....	4
12, 13 .....	8	29, 30 .....	4
14, 15 .....	6		
16, 17, 18 .....	4	31, 32, 33, 34 .....	5
19 .....	6	The rest of the tail is	
20 .....	8.	wanting.	
23, 24 .....	6		

Throughout the dorso-lumbar and sacral regions (*i. e.* up to the nineteenth row), the median scutes are hardly keeled at all, while the outer ones are the more strongly carinate the more external they lie.

In the caudal region, the second scute from the middle line, in the twenty-third row, has a strong keel and angulation, which grows stronger in the corresponding scutes up to the thirtieth inclusive, until the superior and lateral faces of these scutes, in the twenty-ninth and thirtieth rows, are inclined to one another at a right angle and very strongly keeled. I have said that, as a rule, the median line is occupied by a suture between two median scutes ; but in the caudal region\*, in the twenty-fifth row (which corresponds with the sixth caudal vertebra) the two median scutes are replaced by one flat scute, so that there is no suture in the middle line. In the twenty-sixth row there is a similar arrangement, but the flat scute is smaller ; and in the twenty-seventh no trace of it is left, so that the strongly keeled lateral scutes meet in the middle line, which is again occupied by a suture. This continues up to the thirty-first row, when the median scute reappears as a thin vertical plate, broader below and in front, where it articulates with the median lateral scutes, than above and behind, where it exhibits a free edge only covered by the horny epidermis. It is thus that the serrated dorsal crest of the tail is formed. The scutes of the crest exhibit only very small round and distant pits.

The *ventral shield* begins in the neck just behind the level of

\* The second and third cervical rows in *Caiman palpebrosus* and *trigonatus* also contain a median scute, and consequently an odd number of scutes. In *Caiman trigonatus*, the third to the ninth supra-caudal rows have each a median single scute.

the anterior margins of the orbits: the fifteen anterior rows may be termed subcervical, as they lie in front of the thorax. In the first six rows the scutes are very small, and increase in number up to twelve in a row. In the next six rows there are ten scutes in a row, and in the last three, twelve. All these rows are symmetrically divided by the median line. In the three hinder rows the inner scutes are longer than the outer ones; and this is most markedly the case in the fifteenth row, whose innermost scute is half as long again as the corresponding one of the preceding row, and more than three times as long as the outermost of its own row.

The sixteenth row differs from its predecessors and successors, and may be termed the axillary row. It is bent upon itself with an angle open forwards, and is divided into two halves (each of which contains seven scutes) by the union of the middle scutes of the fifteenth subcervical with those of the first row of what may be termed the subdorsal scutes, or those which lie under the thorax and abdomen. Of subdorsal and subcaudal scutes there are, up to the broken-off end of the tail, thirty-seven rows, with the following numbers of scutes:—

Rows.	Scutes.	Rows.	Scutes.
1 .....	12	22 .....	18
2 .....	10	23 .....	22
3, 4, 5 .....	12	24 .....	22
6, 7, 8, 9 .....	14	25 .....	20
10 .....	16	26—28 .....	18
11 .....	14	29—31 .....	16
12—17 .....	14	32—34 .....	14
18—20 .....	12	35 .....	12
21 .....	14	36, 37 .....	10

It will be noticed that there are three more rows of ventral than of dorsal scutes. On endeavouring to ascertain how this came about, I observed that the first subdorsal was a good deal behind the first dorsal row, though the eighth to the twelfth dorsal corresponded exactly with the eighth to the twelfth ventral rows. In the anterior part of the body, therefore, there is a clear general correspondence between the segments of the dorsal and those of the ventral armour.

In the caudal region, again, I found that the twenty-fourth ventral row, which is the first of the caudal rows not excavated by the

vent, corresponded exactly with the twenty-first dorsal row. It was clear, therefore, that three ventral rows were interpolated somewhere between the twelfth and twenty-first dorsal rows; and on close examination I found this interpolation to arise from the doubling of the fourteenth, fifteenth, and sixteenth ventral rows.

I have examined *Jacare fissipes* and *nigra*, *Caiman trigonatus*, and *C. gibbiceps*, in the British Museum; and I find, in all, dorsal and ventral armour having the same essential arrangement as that just described. A specimen of *Caiman palpebrosus* about two feet long, the opportunity of examining which I owe to Dr. Grant, exhibits the dorsal and ventral shields (whose scutes are in the main similarly arranged) very beautifully; and a young *Jacare* of about 18 inches in length, for which I am indebted to the kindness of the same gentleman, proves that the scutes are developed even in specimens of this age. I have no hesitation therefore in expressing my belief that this singularly complete dermal armour will be found to be characteristic of all the species of the genera *Caiman* and *Jacare*. On the other hand, I have examined *Alligator Mississippiensis*, *Crocodylus vulgaris*, *C. biporcatus*, *C. Americanus*, *C. rhombifer*, and *C. bombifrons*, *Mecistops cataphractus*, and *Gavialis Gangeticus*, of various ages and sizes, without having been able to discover a trace of ventral scutes. This is the more remarkable, as the well-marked ventral and dorsal shields of many of the ancient *Teleosauria* would lead one to expect a corresponding exoskeleton (if anywhere) in their nearest allies, the modern *Gavialidæ*. However, *Goniopholis*, with its strong armour, is more like an ordinary Crocodile; and I have recently discovered that a true Crocodile in some respects curiously similar to *C. bombifrons* (*C. Hastingsiæ*) was covered with scutes exceedingly like those of the modern *Caiman* and *Jacare*.

In minute structure the bony scutes of *Jacare* closely resemble those of such a fish as a Sturgeon: a middle layer, containing so many canals as to appear almost cancellated in longitudinal or transverse section, is covered externally by a thin, and internally by a thick, layer composed of bony lamellæ, nearly parallel to the plane of the scute. Round the canals of the middle layer, the bony lamellæ are disposed concentrically, to a greater or less extent. The lacunæ are of very various shapes; and there are perhaps as many short as elongated forms. The canals of the middle layer communicate by large branches with the inner, by smaller and fewer branches with the outer surface of the scute.

In the young *Jacare* mentioned above, I found the dermis to be

distinguishable into two layers. The more superficial of these is thin, made up of irregular or formless connective tissue, and contains many ramified pigment-masses. Its smooth outer surface underlies the rete mucosum. Internally, it passes into the second or deep layer, which consists of successive layers of distinctly fibrous connective tissue, disposed in definite parallel bundles, and having a very regular arrangement. Throughout a space corresponding with the area of each scale, in fact, the bundles of each layer cross those of the succeeding layer at right angles; and the successive tiers of bundles are tied together by short cords disposed perpendicularly to the planes of the tiers. A corresponding arrangement of the bundles of connective tissue has long been known to obtain in the dermis of Fishes and *Batrachia*. At each end of this small "mat" of connective tissue, the bundles, if I may so say, fray out; and at the anterior end, the layers, loosened in texture, bend upwards, spreading out at the same time to become continuous with the fibres of the "mat" in front. In consequence of the matting under the quadrate surface of each scale, the dermis has a peculiar faceted aspect, quite apart from any osseous deposit. Where bony scutes are formed, they appear as very thin perforated plates in the most superficial portion of the deep layer of the dermis; so that there is a single thin layer of dense connective tissue above them, while below them are all the rest of the denser and deeper lamellæ of the dermis. Through the apertures in this primitive osseous plate (the rudiment of the middle layer of the future scute), bundles of connective tissue extend, connecting the deep with the superjacent lamellæ.

If a thin section is made and decalcified with weak acid under the microscope, the calcareous matter, as it is dissolved away, leaves an obscurely fibrous matrix of a different aspect from the surrounding connective tissue, and the endoplasts, or nuclei, of this matrix are seen each to have occupied the centre of a lacuna.

Again, the rudimentary scute lies in the dermis as in a sort of pocket, the superficial and deep walls of which separate from it with great ease; and in good thin sections made through the dermis and scute, there seems to be no direct connexion between the substance of the scute above and below, and the connective tissue with which it is in contact. Nor could I satisfy myself that the margins of the scute were continuous with the surrounding bundles of connective tissue. However, the specimen had been a very long time in spirit; and I am unwilling to lay too much stress upon these observations, which tend to negative the supposition

that the suture proceeds from the direct calcification of the connective tissue of the dermis.

On the other hand, I must remark that horizontal sections of the scutes have presented oblique parallel fissures, sometimes crossing one another, which might readily be supposed to correspond with the lines of separation of ossified bundles of connective tissue.

NOTE.—During a recent visit to Paris, my friend Mr. Busk was kind enough to examine the specimens of recent *Crocodylia* in the Museum of the Jardin des Plantes, with reference to certain points to which I requested his attention. Mr. Busk informs me that there is no doubt about the transverse direction of the premaxillo-maxillary suture in *Crocodylus rhombifer*; and his statements lead me to entertain no question that *C. bombifrons* is a synonym of *C. palustris*.

In the typical specimens of *C. marginatus* and *C. suchus* of Geoffroy St.-Hilaire, the premaxillo-maxillary suture extends back to the level of the seventh tooth.

Mr. Busk has furthermore pointed out to me the existence of another American species of Crocodile—*C. Moreletii*, which has been described by M. Auguste Duméril in his “Description des Reptiles nouveaux ou imparfaitement connus,” &c., ‘Archives du Muséum,’ t. vi. 1852.

This species inhabits lake Flores, in Yucatan; and it is said by M. Duméril to approach *C. Americanus*, from which it differs in the proportions of the skull and in the characters of the dermal armour.

June 21st, 1859.

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On the Habits of the “Aye-Aye” (*Cheiromys madagascariensis*, L., Cuv.). By the Hon. H. SANDWICH, M.D., C.B., Colonial Secretary of the Mauritius. Communicated by Prof. OWEN, F.R.S., V.P.L.S.

[Read April 7th, 1859.]

“Mauritius, Jan. 27, 1859.

“MY DEAR MR. OWEN,—After very great difficulty and much delay, I have at length obtained a fine healthy male adult *Aye-Aye*; and he is now enjoying himself in a large cage which I have had constructed for him.

“He is a most interesting little animal; and from close observa-



tion I have learnt his habits very correctly. On receiving him from Madagascar, I was told that he ate bananas; so of course I fed him on them, but tried him with other fruit. I found he liked dates,—which was a grand discovery, supposing he be sent alive to England. Still I thought that those strong rodent teeth, as large as those of a young Beaver, must have been intended for some other purpose than that of trying to eat his way out of a cage—the only use he seemed to make of them, besides masticating soft fruits. Moreover, he had other peculiarities, — *e.g.*, singularly large, naked ears directed forward, as if for offensive rather than defensive purposes; then, again, the second finger of the hands is unlike anything but a monster supernumerary member, it being slender and long, half the thickness of the other fingers, and resembling a piece of bent wire. Excepting the head and this finger, he closely resembles a Lemur.

“Now as he attacked, every night, the woodwork of his cage, which I was gradually lining with tin, I bethought myself of tying some sticks over the woodwork, so that he might gnaw these instead. I had previously put in some large branches for him to climb upon; but the others were straight sticks to cover over the woodwork of his cage, which *alone* he attacked. It so happened that the thick sticks I now put into his cage were bored in all directions by a large and destructive grub called here the *Moutouk*. Just at sunset the Aye-Aye crept from under his blanket, yawned, stretched, and betook himself to his tree, where his movements are lively and graceful, though by no means so quick as those of a squirrel. Presently he came to one of the worm-eaten branches, which he began to examine most attentively; and bending forward his ears, and applying his nose close to the bark, he rapidly tapped the surface with the curious second digit, as a woodpecker taps a tree, though with much less noise, from time to time inserting the end of the slender finger into the worm-holes, as a surgeon would a probe. At length he came to a part of the branch which evidently gave out an interesting sound, for he began to tear it with his strong teeth. He rapidly stripped off the bark, cut into the wood, and exposed the nest of a grub, which he daintily picked out of its bed with the slender tapping finger, and conveyed the luscious morsel to his mouth.

“I watched these proceedings with intense interest, and was much struck with the marvellous adaptation of the creature to its habits, shown by his acute hearing, which enables him aptly to distinguish the different tones emitted from the wood by his gentle

tapping; his evidently acute sense of smell, aiding him in his search; his secure footsteps on the slender branches, to which he firmly clung by his quadrumanous members; his strong rodent teeth, enabling him to tear through the wood; and lastly by the curious slender finger, unlike that of any other animal, and which he used alternately as a pleximeter, a probe, and a scoop.

"But I was yet to learn another peculiarity. I gave him water to drink in a saucer, on which he stretched out a hand, dipped a finger into it, and drew it obliquely through his open mouth; and this he repeated so rapidly, that the water seemed to flow into his mouth. After a while he lapped like a cat; but his first mode of drinking appeared to me to be his way of reaching water in the deep clefts of trees.

I am told that the *Aye-Aye* is an object of veneration at Madagascar, and that if any native touches one, he is sure to die within the year; hence the difficulty of obtaining a specimen. I overcame this scruple by a reward of £10.

"I quite despair of obtaining the bones of the *Dinornis* or *Dodo*, though I have made every effort. I shall always be proud to be of service.

"Believe me, yours very faithfully,

"H. SANDWICH."

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On the Moulting of the common Lobster (*Homarus vulgaris*) and Shore Crab (*Carcinus mænas*). By S. JAMES A. SALTER, M.B., F.L.S., F.G.S.

[Read April 7th, 1859.]

I AM induced to bring this subject before the Linnean Society, on account of the singularly perfect specimen of the thrown-off slough of a Lobster which I have now an opportunity of exhibiting, and because the process by which it was shed was witnessed and carefully watched by two competent observers—by my friend Mr. Robert Cooke, of Scarborough, a Fellow of this Society, and by the intelligent wife of the Curator of the Scarborough Museum, in an aquarium in which institution the occurrence took place.

The methods by which certain of the Decapod Crustaceans cast their old shells in the process of renewal and growth have already been made the subject of observation and record.

Réaumur, as early as 1712, and again in 1718, saw and described

the sloughing of the common freshwater Crayfish (*Astacus fluviatilis*).

It was witnessed in the common edible Crab (*Cancer Pagurus*) by Mr. Couch, in 1833.

Subsequently the moulting-process was observed by Mr. Gosse, in the Spinous Spider-crab (*Maia Squinado*).

Beyond these three recorded examples, I believe that the actual operation of moulting in Decapods has never been seen, though the sloughs of our common Crustacea, and the animals themselves but recently emerged from their old shells, are familiar to all marine zoologists.

There is no recorded account of the moulting of the Lobster, that I have been able to discover.

The Lobster from which the slough was obtained, and whose operations are the subject of this communication, was an inhabitant of a large marine aquarium in the Museum at Scarborough. The period was July 1857. The aquarium contained the ordinary assemblage of sea-shore animals, and a considerable collection of vegetation, which consisted of *Ulva*, *Fucus*, and other common sea-weeds.

For two days previous to its throwing off the shell, the Lobster was observed in a very peculiar attitude, and to be very busily engaged. Its abdomen was permanently and stiffly erected and straight; while the animal, in this rigid attitude, was hard at work detaching and carrying all the soft sea-weed it could collect to one end of the aquarium, where it thus accumulated a large mass of vegetation, which was afterwards destined to become a screen and protection for its soft body. At the same time, and by the same means, a clearing was made at the other end of the tank, in which it had space for the evolutions which were subsequently necessary for the extrication of its body.

The Lobster remained in the peculiar rigid attitude I have described, during the entire two days previous to the moult. On the third day, a crack was observed along the membrane which unites the dorsal surface of the first abdominal ring with the carapace; and when these parts became separated by about half an inch, the bright-blue membrane of the new shell being plainly visible beneath, the operation of extricating the abdomen commenced. By a strong vibratory action of the whole abdomen, principally in a lateral direction, one segment was, at first, protruded through the split; and this was followed by an interval of complete repose, during which the animal remained quite mo-

tionless. Then, by another vibratory action, the second segment was extricated; then followed an interval of repose, when the third was withdrawn; and so on till, at last, the entire abdomen, after having been bent double upon itself, was turned completely out backwards, and then, elongated and compressed, remained above and parallel to the empty shell that it had occupied, and which was still attached to the under surface of the cephalo-thorax. Hitherto the only orifice of escape consisted in the transverse splitting of the first abdominal segment from the carapace, on the dorsal surface. None of the abdominal segments separated from each other.

Thus far the extrication had commenced at the front of the abdomen, and had progressed from before backwards. It was now observed that the carapace had split from behind forwards, the fissure commencing posteriorly at the transverse split between the carapace and the first abdominal segment, and reaching forwards to the apex of the rostrum, which, however, it did not absolutely divide. The two halves of the carapace then separating posteriorly, the interval between them, together with the original transverse slit, constituted a trifid opening, through which the rest of the animal escaped.

The escape of the cephalo-thoracic portion was effected from behind forwards. First the posterior ambulatory legs were loosened and withdrawn; then followed the next pair; and this process was continued from behind forwards, pair by pair—the withdrawal of each pair of legs being followed by an interval of repose. The limbs were withdrawn very readily from the old shell, slipping out of it as a leg would from a loose boot. No apparent effort accompanied these operations so far.

The extrication of the claws, however, was attended with much and violent exertion. This consisted of two powerful and sudden tugs, the soft abdomen of the Lobster pressing by its under surface upon the upper surface of the empty shell. By this means the soft chelæ were drawn through the narrow joints of the old shell, exhibiting strong, unmistakeable marks of the violence and pressure to which they had been subjected. The escape of the chelæ from their unyielding incasement was not aided by any splitting of the old shell, the large soft hands being drawn by compression through the narrow joints, as a wire is drawn through the contracting holes of a draw-plate.

The efforts for the withdrawal of the chelæ were the last, and succeeded in completely freeing the Lobster from its old case.

Not only the claws, but the parts of the mouth, the antennæ, and the eyes, were all unsheathed ; and with the last tug the regenerate Lobster plunged backwards, and entirely escaped, above and behind the now empty shell—its former tenement.

The operation, from first to last, occupied about twenty minutes, and was performed entirely in view, in that part of the aquarium which the Lobster had cleared of sea-weed.

Immediately after emerging from the old shell, the Lobster, was much deformed : there was a general elongation of the whole animal ; but this was most remarkably the case with the claws, which were quite drawn out of shape. During the few subsequent hours, both the body and the claws became shorter and much enlarged. This increase of size did not result from any unfolding of membrane of the shell previously plicated, as no folds were observable immediately after the emergence of the animal, but from a simple distension, apparently from the imbibition, either by swallowing or by endosmosis, of considerable quantities of water. The membrane of the new shell was perfectly soft, and of a bright blue colour. At first the Lobster was shy and quite inactive, retiring to and remaining concealed among the accumulated sea-weed ; but in a few hours it emerged from its retreat, and moved freely about the aquarium. The membrane of the new shell remained soft for some days, but on the seventh it appeared to have become perfectly calcified.

These are the details of the exuviation of the Lobster whose cast-off shell is before the Society. By a happy accident, the same observers had an opportunity of witnessing the sloughing of another Lobster, in the month of November following. The process was identically the same in every particular ; but it was observed that the subsequent calcification of the shell did not take place till after the lapse of about fourteen days,—a circumstance probably dependent on a lower temperature and a less active nutrition. These are, I believe, the only two instances in which the exuviation of the Lobster has been actually witnessed ; but there exist specimens of sloughs which are entirely in keeping with this description. In the fish-house of the Zoological Society of London there are two specimens which were cast in the tanks there ; and in each there is the same transverse splitting of the carapace from the abdomen, and the longitudinal splitting of the carapace itself, without any other opening for the escape of the animal.

One or two general observations are suggested by the foregoing

description. In the only examples of the exuviation of macrourous Decapod Crustaceans, there exists a singular diversity in the process itself. In *Astacus*, as described by Réaumur, the process commences with the escape of the cephalothorax; in *Homarus*, as I have now described it, it begins by the emergence of the abdomen. In *Astacus* the carapace is detached and thrown off bodily and unbroken, being severed from its attachments with the lateral portions of the cephalothorax, as is the case in the Brachyura; whereas in *Homarus* the lateral attachments of the carapace remain, whilst the plate itself is split up the centre. In *Astacus*, as is also the case in the Brachyura, the thrown-off slough is uniformly left resting on its dorsal surface; in *Homarus* the reverse is uniformly the case. But the most striking dissimilarity is to be found in the circumstances *stated* to attend the liberation of the chelæ. Prof. Bell, in the Introduction to his 'History of the British Stalk-eyed Crustacea,' remarks—"It is impossible to imagine that the crust of the legs, and especially of the great claws of the larger species, could be cast off, unless it were susceptible of being longitudinally split" (p. 35), and he then proceeds to give the account detailed by Réaumur of the longitudinal splitting of the shell in the neighbourhood of the joints of the claws in *Astacus*, so as to allow of the extrication of the hands. Nevertheless, however impossible it may appear for the chelæ to escape without this splitting, no such circumstance occurs in the exuviation of *Homarus vulgaris*; and when we consider that the hands of *Astacus* are small in proportion to the wrist-joints, and that in *Homarus* they are larger in proportion to those joints than in any other of the Macroura, this dissimilarity in the mode in which the claws escape is the more remarkable, and, I confess, to my own mind it suggests the suspicion that the distinguished and usually most accurate French naturalist to whom I have referred may possibly in this instance have been led to consider as a fact that which was to him a supposed necessity\*.

Since the foregoing account of the moulting of the Lobster was written, I have dredged a specimen of the common shore-crab (*Carcinus mænas*), in the act of casting its shell. This little crustacean had taken refuge, no doubt for the safe and secret per-

\* The suspicion above expressed has been fully confirmed by observations made by Mr. J. J. Bennett, the Secretary of the Linnean Society. Mr. Bennett informs me that, in an aquarium in his possession, an *Astacus fluvialtilis* has twice cast its shell, and the process of moulting was on each occasion accomplished without any splitting of the shell at the joints of the claws.

formance of sloughing in a forest of *Zostera*, on one of the mud banks in Poole Harbour, and while scraping these weeds with a keel-drag it fortunately fell into my net. It shows how the *Brachyura* leave their old shells by the horizontal splitting away of the carapace from the other portions of the shell—the carapace itself remaining entire; and it also shows (and this was my principal object in exhibiting the specimen) the enormous amount of increase of size upon emerging from the shell, and the rapidity with which that increase takes place. The animal, as now seen, is in exactly the same state as when taken out of the water, and its bulk is probably some four times larger than the area of the shell in which it had been encased only a few minutes before. I retained the Crab in connexion with its old shell, and prevented its further escape by wrapping it in paper, so that it could not move its limbs. I thought such a specimen would be telling and illustrative, and that the old shell, being in contact with the new, would afford facilities for contrast. In this condition the Crab died, and, being out of water some time, it became dry, and the soft new shell collapsed and bulged in; but, upon placing the dead Crab in sea-water, the soft shell very speedily imbibed sufficient fluid to distend it to its previous dimensions. This of course was simply the effect of endosmosis. Mr. Couch, in describing the moulting of the common Edible Crab (*Cancer Pagurus*), speaks of its *drinking* large quantities of water, and *thus* becoming distended; but I rather think that the distension takes place by endosmosis, even during life. There are two circumstances which militate against Mr. Couch's opinion:—first, the rapidity with which the distension occurred in the Crab I have just exhibited, while still in the act of moulting; and secondly, that after death the same distension occurred when the Crab was immersed in sea-water; in which case it could only be by endosmosis. Indeed to me it seems very probable that this very endosmosis, when the water once comes in contact with the new, uncalcified shell, may, by distending it, be the main agent in the breaking open and dissevering of the elements of the old shell.

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On the Shell-bearing Mollusca, particularly with regard to Structure and Form. By ROBERT GARNER, Esq., F.L.S.

[Abstract of a Paper read before the Society.]

THE author commences the paper, of which the following is the substance, with some general observations on the morphology of

animals. He thinks that the idea of an ascending and successive scale or chain of creation is, in the main, correct, when the great classes, and not species or genera, are made the links,—the disturbing or modifying influences being due to modes of life, food, habitat, &c., and causing a different (say the quinary) distribution. He is an advocate, too, for the doctrine of one fundamental plan of organization, and thinks that, in the zoophyte, there is a real union of both the animal and vegetable *nisus*.

The great divisions of this chain, the *radiate*, *articulate*, *molluscos*, and *vertebrate*, constitute an ascending series; the links of the chain, so to speak, being in each case, for such an extent, of a particular pattern; but, nevertheless, one of the highest mollusks may surpass in organization one of the lowest fishes, or an articulate creature a mollusk. The author considers such great divisions of animals, as well as minor ones—the gasteropodous mollusks, for instance—as realities, and not mere abstractions; and that they are independent of the circumstances of food, habitat, locomotion, &c., just referred to. So great, however, are these disturbing influences, that they often produce an extraordinary external resemblance or pseudo-analogy between animals of a very different nature, as between a *Chiton* and an *Oniscus*, and they are connected intimately with, though not the cause of, what we call specific or generic distinctions. Aërial life, in contradistinction to aquatic, raises much the character of the locomotive organs; yet this is subordinate to type: hence the creeping Mollusk appears to have commonly a higher organization than the flying Insect.

The cartilages of *Sepia* have a true resemblance to those of a Skate, and the Cirrhipede truly connects the Mollusk with the Crustacean. The author regards *Dentalium* as a gasteropod, differing in this respect from Lacaze-Duthiers, whose beautiful paper, however, renders it supererogatory to say anything more on this animal, except that the author believes that the presence of the spiniferous tongue, of a proboscis, and the nature of the food, are favourable to his view: he also takes the feathery tufts to be the branchiæ.

The anatomy of *Aspergillum* is similar to that of *Pholas*; its mantle, however, is all but closed in front, and ends in an obliquely-set muscular disk, applied to the internal surface of the rose of the so-called *arrosoir*, the openings of this part of the shell giving exit to certain processes and fimbriæ of the fleshy disk,—a narrow slit being also left in both the muscular and shelly disks for the exertion of the small, compressed and curved foot. The



animal is enveloped within the shell by a rather horny, general membrane.

The author touches upon the anatomy of some other genera of Lamellibranchiata. *Solemya* has its firm, horny, dark cuticle doubled inwards from the valves over the tubular mantle; behind, it has an anal opening, and a second fringed branchial slit lower down: the branchiæ and tentacles are single on each side, the former being remarkably feather-like. The foot is similar to that of the *Solens*, but crenate round its anterior disk. *Cyrenoides* has the mantle closed below, but with two openings behind, the upper one with a semicircular internal fringe, incomplete above; a callous rim and fringe surround the mantle, which has also a third opening for the long, compressed, bent, and blunt foot. This last has a remarkable crystalline body, directed from the stomach to the pedal pore, apparently, as in *Cardium*, subserving by its elasticity to the extension of the foot, and consequently to locomotion; at any rate, it is not a sexual distinction. The external branchiæ are short, and the upper or internal branchial cavity does not communicate with the lower one. The renal organ opens near the branchial nerve, and the ovary at the base of the abdominal mass. *Trigonia* is remarkable for its beautifully fringed, open mantle, its pectinated pits for the secretion of the teeth, and the large scythe-shaped foot, trenchant before and peaked behind, and having a fringed disk. *Vulsella* is allied to the Oyster, but more so to the Pectens, having a small cylindrical grooved foot and appended visceral mass, but no byssus; the rectum perforates the heart, and has a tentacle above its opening. *Perna* has a similar foot, and a very bulky byssus, with a large muscle attached to their base; the lips resemble those of the Oyster. The anatomy of *Crania* is little different from that of *Orbicula*, as described by Owen,—the beautiful arms folded in several coils, with a simple mouth at their base, the stomach and short intestinal canal surrounded by the liver and hearts, and terminating by a lateral bend; the ovaries ramifying in the mantle; the adductor muscles being four in number, with some bands to the mantle; and on the latter, glandular markings corresponding with the microscopic sculpture of the shell. With respect to *Anomia*, the author has again been anticipated by Lacaze-Duthiers, though he has already given, in another paper, most of its anatomy and morphology: he would simply call attention to its very long and curious crystalline stilette, unconnected with the minute foot.

With respect to that *questio vexata*, the sexes of the Lamelli-

branchiata, he observes that any number of individuals of *Cyelas* may be examined, and young fry will be found in the branchial laminae in all; that all Oysters have ova, and also all individuals of *Pecten maximus*, the subpedal mass being visibly composed of an ovary and a testis. He is obliged to believe that one species of British *Anodon* is universally oviferous. But the common Edible Cockle appears to have the individuals of different sexes, and the same may be said with regard to *Mytilus edulis* and *Patella*.

The spermatozoa in the Cockle are oblong and a little curved, and torulated, as it were, whilst they are pear-shaped in *Mytilus*; they are also extremely minute, and their appendages must be very fine, for with a power magnifying 500 diameters they are scarcely to be seen.

In the shell of a *Patella*, *Emarginula*, or *Haliotis*, we have the two conjoined valves of a lamellibranchiate mollusk; and through such forms as *Calyptraea*, *Hipponyx*, *Navicella*, and *Nerita*, we arrive at the ordinary form of the gasteropod with its operculum.

Then follows a disquisition on the progressive tendency to a spiral geometry in these animals, due to a varying plan of conformation, and not to the force of the heart, there being generally an atrophy of the left side of the body. In *Nautilus* and *Argonauta*, the shell and mantle are reversed in position to what they are in the Gasteropods, whilst *Sepia* and *Hyalaea* agree rather with the latter. The symmetrical shell of the lower Gasteropods undergoes a lateral torsion in the higher, spiral forms, to become again symmetrical in the Cephalopoda. The branchiæ in *Patella* retain a position analogous to that of the same organs in the Lamellibranchiata; in some Chitons they have a tendency to retract towards the anus, as in *Doris*; in *Fissurella* they waste at the sides and become developed above the neck, as in the spiral Gasteropods; but in them, the right branchia, and right side of the mantle are principally developed. From this torsion arises the form and spire of the shell. In *Aplysia*, where the branchial fissure is far back and to the right side, the right respiratory nerve preserves a superior position, and passes backwards to form its ganglion at the front of the branchial opening; the left, on the contrary, passes under the œsophagus to form a second ganglion, not mentioned by Cuvier, behind the first. In the more spiral Gasteropod the torsion is greater; the right nerve, for instance, mounts upwards over the digestive canal to form its ganglion quite in the left flank, whilst the left goes below the digestive

canal to attain the right flank. In *Sepia* the branchiæ are again symmetrical and abdominal.

The shell of the young *Sepia* is composed of distant plates, only connected by minute transversely striated laminae or flattened tubes, producing by their insertion a beautiful appearance of sinuous lines, very like those of a Baculite or Ammonite; and the spongy part of the shell, so constituted, is probably filled with air from the cavity of the body situated immediately in front, the intervening membrane having a peculiar structure. This cavity of the body exists in much lower mollusks; air being apparently secreted in it, to lighten the animal.

The author thinks that, in considering the anatomy and form of the body of the Gasteropoda, about ten species may be taken as types of corresponding families.

1. *PATELLA and its congeners*.—He claims to have been one of the first to show the termination of the oviducts and renal organs between the processes of the branchiæ in the Chitons. As they are commonly phytivorous, the intestine is often very long and disposed in large coils, in double apposition; the buccal apparatus is very remarkable. *Chitonellus* differs but slightly from *Chiton*, the central elements of its tongue, however, being little developed, though having the same tessellated basement membrane. The tongue of *Emarginula* differs much from that of *Patella*, having an immense number of serrated side-hooks and a dilated middle portion.

2. *CALYPTREA, &c.*—The mollusks of this division have often supranuchal branchiæ, as have some of the last; the sexes also are frequently separate, rendering copulation necessary; and they are sometimes partially spiral, with a tendency to form an operculum. However, the little *Ancylus fluviatilis* appears to be what is commonly called hermaphrodite, with a branchial lamina on the left side, together with the heart and openings of the genital organs; the stomach has a cæcum, and the penis a long filiform appendage; the female parts opening near the rectum and behind the male organs. It must respire by water rather than by air, for, in a rapid stream, the stones at the bottom are covered with *Ancyli* (upon which also its round oothecæ, each containing four or five ova, are deposited), and it appears impossible for them to get to the surface to breathe. On the contrary, the lake-*Ancylus*, though the margin of its mantle is ciliated, may perhaps come to the surface, ascending the stalks of the Water Persicaria, on which it is mostly found, and on which its oothecæ are deposited. When the dark cuticle of this last minute creature is removed,

its organs may be seen to be reversely disposed to those of the larger species, the heart being placed to the right, before the apex of the shell, and the rectum also on the same side.

3. *DORIS*, &c.—The little *Doris aspera* swims, back downwards, on the surface of a glass of sea-water, copulates, and deposits its semicircular oothecæ. The brain of the common Lemon Doris is of a fine orange colour, enveloped in a glandular matter, and is constituted by a complicated assemblage of ganglia: there are acoustic sacs and dark ocular spots upon it. There are six ganglia on the buccal mass, and about six or eight minute ones on the stomach. The anal sac appears to be a purple- or ink-bag; and the so-called matrix is composed of a peculiar substance, swelling enormously in water, of which it renders a large quantity viscid, and being also coagulable by alcohol and bichloride of mercury, but not by heat. Spermatozoa were found in the genital vesicle, as well as in the epididymis and its cæcum. The spines of the lingual plate are uniform, and in number about 10,000.

4. *APLYSIA*, &c.—*Aplysia* has been before alluded to. Cuvier, in his generally beautiful drawings, has scarcely done justice to (5) *Ianthina*, nor to its beautiful float and ootheca; it is peculiar for its fins, and the disk at the back of the foot. With respect to *Magilus*, it should be removed from the (6) Tubulibranchiata, its animal being a *Purpura* in structure, with a bent horny operculum, and a very long linear appendage on the right side of the head, leading to the supposition that the animals are of different sexes, though there seem to be difficulties in the way of sexual congress. In the specimen examined, the spire of the shell was not solidified; the animal had a short proboscis, with rather bent subulate feelers, and eyes on the outside; it had also a rich purple secretion near the rectum on the right side.

7. *TROCHUS*, &c.—Some of the species of *Trochus* surpass even *Emarginula* in the beauty of their lingual apparatus. The renal organ opens into the bottom of the branchial cavity, contrary to its disposition in *Helix* and *Lymnaeus*, where its exit is near the respiratory orifice. In *Planorbis*, that part of the respiratory cavity receiving the excretions seems separated by an imperfect valve from the right portion. With respect to the secretion of this organ, it consists, in both Gasteropoda and Lamellibranchiata, of numerous pellucid globular bodies, containing opaque earthy nuclei or granules, and presenting different appearances in *Anodon* (for instance), *Cyclostoma*, *Buccinum*, and *Helix*. When these bodies are incinerated, lime is left, which in some cases appears to have been combined with oxalic acid. The little *Nerita litoralis* presents

the structure of the Turbonidæ very prettily and in small compass, particularly in the very long spiral tongue. *Delphinula* has the fringed mantle and sides and very wonderfully armed tongue of the other Trochidæ. *Melania* is of similar organization to our well-known *Paludina*, the stomach compound, the mantle and bilobed head fringed, and the latter marbled like that of *Paludina*. *Ampullaria* appears to be truly amphibious.

8. **BUCCINUM**, &c.—*Natica* presents much the same structure as the common *Buccinum*, but has a muscular disk anterior to the mouth,—a disposition, with some variations however, found in other mollusks. The first and second stomachs are at a distance from each other, the tongue is little developed, and the branchiæ (often single in the Turbonidæ) two in number. *Purpura* also differs but little from *Buccinum*. *Ovula* is a less attainable mollusk: the foot is long and rather narrow, and subventral rather than subtrachelian, with a sinuosity on the right of the neck, where also is a short hooked penis in the male, receiving a vas deferens from near the rectum behind; there is a large and small branchia, and the reflected portion of the mantle is covered with tubercles and tentacles,—no doubt a fine garnish in the living animal; the mouth has a muzzle, and there are small eyes on the external sides of the curved, awl-shaped tentacles; the elements of the tongue are beautifully toothed and serrated.

9. **LYMNÆUS**, &c.—Of the air-breathing aquatic and (10) terrestrial gasteropods the most interesting particulars are their generative organs, which the author proposes to re-examine. The brain of *Helix aspersa* is composed internally of pyriform or oval ganglionic vesicles, each giving origin to one or more nervous fibres. The acoustic sacs are similar to those of *Doris*. The nerves from the upper part of the ring are enveloped in a darkish neurilemma, and comprehend no doubt olfactory, optic, and tactile twigs; there being the buccal ganglia for taste, and the acoustic sacs for hearing; the twigs, however, forming the buccal or pharyngeal ganglia have a broad double root on each side, near the origin of the above three nerves. The lower part of the brain is very analogous to that of *Sepia*, giving off nerves to the foot, and external and internal respiratory ones to the mantle, respiratory opening, branchiæ, &c. *Lymnæus* has the cephalic ring formed by about twelve ganglia, exclusive of two large and two minute ones on the buccal mass. The upper portion of the ring has ganglionic swellings, but in other respects the nerves are as in *Helix*. Its lower portion consists of two pedal nerves, and has the

acoustic spot and a minute ganglion upon it; behind, this lower portion consists of five ganglia connected with both the anterior and upper swellings by a cord, but separated from the former by the aorta, as usual, and giving nerves to the flanks, pulmonary orifices and sac, heart, stomach, and viscera. The lower ganglia are bright yellow.

With respect to the Pteropoda, the branchiæ in *Hyalæa* exist as a delicate membrane under the swollen part of the shell, in structure much like the same part in the Ascidians, the inlet being through the anterior opening of the mantle. There are eyes at the fold of the mantle behind, and two small tentacles above the mouth; the heart and rectum being on the left side, and the generative opening at the base of the right ala. *Cleodora* is a very beautiful creature, with the same disposition and structure of viscera; brain-spots but no eyes were visible; the mantle had beautiful muscular bands; the branchiæ as above; the buccal apparatus is imperfect in both. *Cleodora* has similar membranous expansions with *Hyalæa*, and also a sort of triangular lip.

*Argonauta* has a lachrymal pore before and beneath the eye. The beautiful and obvious respiratory mechanism in the Cephalopoda needs not to be described. There is a large sac behind the viscera of the Argonaut, which opens on each side; it is perhaps of some hydrostatic use. There are at least three pairs of salivary glands, of which four open on the floor of the mouth, and two or three at the commencement of the gullet. Several small shells of Pteropoda and fragments of Cephalopods were found in the stomach, on which was observed the large nervous ganglion found in all these, as well as in lower mollusks. The branchial nerves have each two ganglia, of which the last at the root of the branchiæ is rounder than the other; the branchial hearts have processes as in *Sepia*. In *Sepia* two openings lead from the respiratory sac into the cavity containing the venæ cavæ and their secreting appendages often imbued with glittering crystalline particles, and from the above cavities a wider opening on each side leads into a second sac further back, situated in front of the shell. There are auditory sacs in the Argonaut. The oviducts have separate openings, but originate together. Both *Sepia* and *Argonauta* are infested with a subcutaneous filiform entozoon, hooked anteriorly and rolled up spirally in the former. *Loligo media* and *Sepiola* have but one oviduct, and the two large, glandular, laminated organs, opening at their summits, are wanting in *Argonauta* and *Octopus*. In *Sepiola* one would almost think that copulation takes place, for the

author has taken what he supposes to be the capsules of *Needham*, with dilated oval ends, tubular and bent pedicles or processes, enclosed elastic filaments, and adhering zoosperms, from the oviducts of the female: he has made the same observation also in *Sepia*. The latter has very similar male organs to *Octopus*, as described by Cuvier. In the embryo *Sepia*, the yolk enters below the mouth and opens into the upper stomach, but the beak of the animal also appears to be inserted into it behind. The vitellus in reality therefore enters by the foot, as it does in *Bulimus*, and probably in all Bivalves.

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On the Linnean Manuscript of the 'Museum Ulricæ.'

By SYLVANUS HANLEY, Esq., F.L.S.

[Read Dec. 3, 1858.]

NOT the least important result of the investigations of the Committee appointed by the Linnean Society to examine the condition of the collections and manuscripts of Linnæus, was the rediscovery of a written copy of the 'Museum Ulricæ.' The volume was manifestly, from internal evidence, a legible transcript of the original manuscript of that work, with alterations and interpolations in the peculiar handwriting of the author. It was, indubitably, the unpublished catalogue so often mentioned in the tenth edition of the 'Systema,' and contains descriptions of certain species alluded to as defined, yet, strangely enough, omitted in the printed edition. It is worthy of notice for many reasons: it corrects the frequent misprints; explains the many fallacious allusions to preceding species, their sequence being very different; it exhibits those early synonyms, which, culled from comparison with the actually described specimens, had been eventually supplanted by supposed better representations; above all, it imparts to us those original headings, or diagnoses (condensed from the subsequent details), which had been suppressed, of old, in favour of those already published in the 'Systema.'

This wholesale substitution, adopted by Linnæus, as a ready method of avoiding a tedious revision of all the headings, when he absorbed in the more comprehensive groups of his 'Systema' the members of manuscript genera he had determined to reject, involved a serious amount of confusion; for, oftentimes, the species of the two works, although designated by the same appellations, were totally distinct; and the combination of the diagnosis of the one with the details of the other displayed an array of features not known to be associated in any object in nature.

The generic arrangement exhibited in the manuscript differs essentially from that which appeared in the final edition of his 'Systema Naturæ.' As a whole, it is decidedly inferior, yet it segregates certain natural groups, such as *Lyra* and *Cassida*, the value of which have been acknowledged by all modern naturalists. The following list and sequence of the genera comprised in it, cannot, indeed, be regarded as an entire system, for certain groups, viz., *Chiton*, *Lepas*, *Teredo*, *Sabella*, and the typical forms of *Mya*, *Macra*, and *Anomia*, were not at that period represented in the Museum; but it is not devoid of interest, since it manifests a transitional stage in the progressive advance to that matured scheme which was finally elaborated in the pages of his revised 'Systema.'

Dentalium.	Haliotis.
Patella.	Nautilus.
Nerita.	Cymbium (=Argonauta).
Helix.	Spondylus.
Turbo.	Ostrea.
Trochus.	Pecten.
Turricula.	Area.
Buccinum.	Pinna.
Lyra.	Mytilus.
Morion.	Solen.
Conus.	Tellina.
Voluta.	Chama (not that of the 'Systema').
Strombus (not that of the 'Systema').	Cumus (=Venus).
Harpago (=Strombus).	Pholas (not that of the 'Systema').
Murex.	Trunculus (=Donax).
Cassida.	Bucardium (=Cardium).
Cypræa.	
Bulla.	

Besides the four genera (*Chiton*, *Lepas*, *Teredo*, *Sabella*) that were excluded from this catalogue, either from the absence of specimens, or from mistrust of their being veritable Testacea, six of the remaining 32, namely, *Pholas*, *Mya*, *Macra*, *Chama*, *Anomia*, and *Serpula*, were likewise omitted, not being yet eliminated from *Solen*, *Bucardium*, *Spondylus*, *Ostrea*, and *Dentalium*. To counter-balance these, we find no less than eight subsequently abandoned groupings:

*Turricula* (an undefined amalgam of the long-spined species of *Buccinum*, *Murex*, and *Strombus*).

*Lyra* (the *Harpa* and *Purpura* of the Lamarckian school).



*Morion* (an unnatural compound of *Eburna*, *Auricula* proper, *Pythia*, &c.).

*Strombus* (a combination of the immature members of the received genus with *Pyrula*, *Fasciolaria*, and other allied forms).

*Cassida* (nearly the modern *Cassis*).

*Pecten* (equal to *Lima* and *Pecten*).

*Chama* (the *Tapes* of recent conchologists).

*Pholas* (chiefly composed of *Artemis* and *Lucina*).

It may be remarked, moreover, that the simple univalves commence, and the bivalves close the series; the exact converse of the order in which they are marshalled in the two principal editions of the 'Systema Naturæ.'

I feel assured, after a careful study of the manuscript, that the names eventually allotted to the shells of the 'Museum' did not result from a careful comparison of the royal specimens with the typical examples in the private collection of our author, but were attached to the species, either from the identity of the written and printed synonymy, or from the general accordance of their described features with the meagre characteristics enumerated in the prior publication.

The erased nomenclature of the species, however, was very dissimilar, and was scrupulously based upon a supposed identity of the specimens with those delineated by Rumphius, Klein, and d'Argenville. Assuredly at that period of his career, our author entertained the same profound respect for the laws of priority which is professed by all modern naturalists; and I hesitate not to affirm that, from the crude and inharmonious theories of his predecessors, he eliminated a system of Conchology that was better suited to the requirements of the age he lived in than any more elaborate arrangement would have been. For simplicity attracts the student, whom a more complex (even if more natural) method would repel; and for the collection of an adequate mass of materials wherewith, eventually, to build up a more symmetrical and widely-based structure, a multitude of comparatively unskilled labourers is more efficacious than a small knot of the most erudite architects.

Before inviting the attention of my readers to the original headings of the 'Museum Utricæ,' and to my brief account of the variations in the written copy from the text of the printed version, I must premise, that it has not been my practice invariably to notice, in the summary, such trifling differences of construction as the preferential use of the ablative for the nominative case, where the verbal change involved no alteration of the precise meaning.

## MUSEUM LUDOVICÆ ULRICÆ REGINÆ.

## CONCHYLIA.

## CHITON. LEPAS.

Nothing relating to these two genera was found in the copy.

## PHOLAS.

The *Pholas* of the manuscript is perfectly dissimilar to that of the 'Systema.' Our author had evidently, when he first wrote the 'Museum Utricæ,' not appreciated the remarkably striking characteristics of this group, having located the only species he then knew (for *P. candidus* seems a subsequent discovery) with the *Solens*.

*P. CANDIDUS.* Not mentioned in the manuscript.

*P. CRISPATUS.* *Sol.* ovatus, obtusissimus, cardinis dente depresso rotundato.

The Appendix to Lister was not cited; "Habitat in Anglia, Suecia," was appended to the description, which in many respects was inferior to the published one. The account of the hinge was merely "Cardo dente dilatato rotundato extus excavato."

## MYA.

The three incongruous forms assorted as *Myæ* were not so united in the MS.; the second being very properly placed with the *Mussels*, the other two ascribed to *Solen*.

*M. LUTRARIA.* *Sol.* ovali-oblongus, cardine laterali dilatato semiorbiculato.

In lieu of the reference to Lister (whose work does not appear to have been consulted by our author at the period when this portion of his manuscript was written), plate 45, figure N, of Rumphius was quoted as illustrative. The published account of the hinge is much more complete than the written one, which was apparently drawn up from a worn specimen; it ran as follows: "Cardo extus vix gibbus, intus constans laminis 2 semiorbiculatis concavis introrsum spectantibus."

By a slip of the pen, in my 'Ipsa Linnæi Conchylia,' I had termed Brown's figure of the Linnean *Mya lutraria*, *L. oblonga*, instead of *L. elliptica*.

*M. PERNA.* *Myt.* lævis, cardine terminali unidentato.

The intended name was *M. Magellanicus*.

*M. VULSELLA.* *Sol.* oblongus, linguæformis, cardine terminali dilatato semiorbiculato.

"Pinna linguæformis subfalcata" was written after the reference to the 'Museum Tessinianum;' hence it seems that Linnæus did not himself consider that he had used the binomial method in that work, or he would have quoted it as *P. lingulata*.

"Rumph. 148. t. 46. f. A," and "Gualt. t. 90. f. H," were the unpublished synonyms.

## SOLEN.

Testa valvulis utrinque hiantibus. Cardo dente unico inflexo recurvo.

The *Mya lutraria*, *M. vulsella*, and *Pholas crispatus* were originally included in this genus.

S. VAGINA. *S. linearis* rectus, cardinibus unidentatis.

"Habitat in Indiæ littoribus arenosis : in mari Rubro (*Hasselquist*)" was the recorded locality in the MS., where the European shell delineated by Gualtieri was not then included : "Klein, 163. t. 11. f. 65" (a copy from the cited figure of Rumphius) was its substitute.

S. SILIQUA. *S. linearis* rectus, cardine altero bidentato.

The wretched drawings of Argenville were not quoted ; but "Bonan. 2. f. 56" (error for 57), "Planc. t. 3. f. 6," and "List. Ang. 192. t. 5. f. 37," were cited instead.

S. ENSIS. *S. linearis* subarcuatus, cardine altero bidentato.

The final remark was not in the MS.

S. CULTELLUS. *S. ovali-oblongus* curvatus.

"Habitat in Amboinæ littoribus arenosis" is an addition of the MS. The intended name (derived from Rumphius) was *cultriformis*,

S. RADIATUS. *S. ovalis*, cardinis costa tereti.

"Habitat in littoribus arenosis Xulii (?) Amboinæ" is an addition to the published account. The intended specific name was *violaceus*, an appellation bestowed upon it by Rumphius : "*solida*" was an emendation.

S. STRIGILATUS. *S. ovalis*, oblique striatus.

"Bonan. 2. f. 76" (error for 77) was an unpublished synonym.

S. ANATINUS. *S. ovatus* membranaceus, costa falcata.

*Rostrum anatis* was the intended name.

## TELLINA.

Testa altero latere inflexa. Cardo dentibus aliquot, raro lateralibus.

T. GARGADIA. *T. antice* rugosa, rima dentata.

The absurd "marginis posticum latus remotum" was a misprint for (dens) "marginis posticus, latus, remotus."

T. LINGUA-FELIS. *T. subovata* scabra.

"Klein, t. 11. f. 62" (cited in the 'Systema'), and "d'Arg. t. 25. f. G" (the description of which suits better than the drawing) are the additions of the MS. : "sesquialtiore" was the printed emendation of "latiore."

T. VIRGATA. *T. ovata*, striis transversis retrorsum imbricatis, dentibus lateralibus.

The erroneous reference to d'Argenville was not present : "Klein, 158. Tellina virgata Rumphii" had been added by Linnæus. A very large portion of the printed account is wanting in the MS., to wit—"æquales. Intus radiis obsolete incarnatis picta." "Labris rugosis et scabris," "hymene tectis. Anus est rima concava," "primores," "transversi cum cavitate pro oppositis dentibus," "longitudinalem." The "retrorsum" was originally "sursum" ; "dextrum" was "sinistram" ; "Tertius dens" was "Altera testa."

**T. GARI.** *T. ovalis*, striis transversis retrorsum imbricatis, dentibus lateralibus nullis.

The **G** in the reference to Rumphius, and the **F** in the reference to d'Argenville were misprints for **D** and **I**, and were so published in the 'Systema': the "primoribus" was an emendation.

**T. ALBIDA.** *T. ovalis*, lævis, nymphis prominulis. "Primores" was an emendation. The species was unnamed.

**T. FOLIACEA.** *T. antice scabra*, rima serrata.

The Rumphian name "folium" was the intended appellation: "Klein, 162. t. 11. f. 64" was cited, as in the 'Systema': "aciatum" was the reading for the printed "acutum."

**T. PLANATA.** *T. ovata plana*, transversim striata, marginibus acutis.

The erroneous reference to Gualtieri (whose figure **C** looks more like the species than his **G**) is not to be found in the manuscript. The species was not named.

**T. LÆVIGATA.** *T. ovata lævis*, nymphis intractis.

The figure of *T. chloroleuca* in Rumphius was not quoted, neither was the hence-derived appellation attached: the "radiato" and "primoribus" were also subsequent additions.

**T. RADIATA.** *T. ovali-oblonga*, longitudinaliter substriata, sutura postica canaliculata. "Obsoletis" and "primores" were subsequent emendations.

**T. ROSTRATA.** *T. oblonga*, antice angulato-rostrata.

The *T. rostrata* of the final edition of the 'Systema' was assuredly the *T. Spengleri*, and with that shell solely will the printed account in the 'Museum Ulricæ' accord. But the five earlier lines of the description (save "et albus"), and the detailed dentition (except "fossula distinctus"), with the varieties *a*, *b*, *g*, and the same synonyms as in the tenth edition of the 'Systema,' appear in the MS. with the name *T. petasunculus* attached. Whether designedly or not, there was a pictorial definition of *T. vulsella* in the earlier 'Systema;' and if an author be not allowed to amend his description, *T. vulsella* is better entitled than *T. Spengleri* to the name *rostrata*. "Margo exterior parum repandum est" was written in the MS.

**T. REMIES.** *T. rugosa*, suborbiculata.

The expressions "hians," "primores," "remoti," and the last five words of the details were absent; "utrinque" followed "duo"; "non" in place of "vix" was the earlier reading.

**T. SCOBINATA.** *T. scabra orbiculata*.

"Primores," and "in altera testa profunda fossula distinctus," were not in the copy.

## CARDIUM.

Cardo dentibus baseos binis, marginis solitariis remotis acutis. Valvulæ gibbæ, hinc figura cordis.

**BUCARDIUM** was the epithet applied in the written copy to the members of this genus, to which the *Solen bullatus* of the 'Systema' was correctly referred. *Mactra* had not then been separated.

C. COSTATUM. *Buc. sulcis costis elevatis membranaceis.*

The original description has been somewhat enlarged in the press, by the addition of "brevissimis," "et extrorsum flexis," "fossula distinctus; at vero ille sub ano quasi duplex": "minus vero ad latera sulcata," moreover, was simply "ad alterum latus": the only expression omitted in printing was "reflexus," which followed "Anus marginæ."

C. CARDISSA. *Buc. compressum, valvis carinatis, natibus contiguis.*

"Colum. Aqu. 19. t. 16" (cited also in the 'Systema') was quoted in the MS. from which the "vix," "subcontigui," "remotus, validus, fossula distinctus," were absent. The "Rima" was termed "subrotunda" instead of "cordata."

C. HEMICARDIUM. *Buc. subquadrilaterum: valvulis carinatis, umbonibus distantibus.*

"Fasciis" was a misprint for the original "facies": "sulcis convexis" was written "sulcis excavato-rugosis." There was no specific appellation.

C. MEDIUM. *Buc. subcordatum subangulatum; valvulis angulatis sulcatis lævibus.*

The prefatory remarks were the only portion of the printed description to be found in the MS. The species was not named, but was quoted in the 'Systema' before the publication of its details.

C. ACULEATUM (misprinted "muricatum"). *Buc. subcordatum, sulcis convexis, linea cava exaratis, versus apicem dentatis.*

The intended name was *verum*.

C. ECHINATUM. *Buc. subcordatum, sulcis acutis exaratis linea elevata ciliata aculeis inflexis plurimis.*

"List. Ang. 188. t. 5. f. 33, *Pectunculus echinatus*," "Bonan. 2. t. 90," "Gesn. Aq. 131, 132," "Faun. Suec. 1339," "Rondel. Aq. 22," were the original synonyms, to which our author had subsequently added "Klein, 139. t. 10. f. 40." "Alba" followed "gibba"; "parum antrorsum inflexis" was the reading for the printed "erectis subulatis"; "extrorsum" for the "uti extus": "brevioribus. Anns lævis, sutura simplici prominula," "recurvi," "fossula distinctus," were emendations.

C. TUBERCULATUM. *Buc. subcordatum, sulcis obtusis nodosis transversim striatis.*

"Gualt. t. 71. f. M." was a correct additional synonym.

C. ISOCARDIA. *Buc. cordatum, sulcis imbricatis squamis fornicatis.*

"Klein, 138. *isocardia fragum*" had been interpolated by Linnæus; hence the name, which was not in the original. The "fossula distincti" has replaced the earlier "validi."

C. FRAGUM. *Buc. subcordatum subangulatum, sulcis notatis semicirculis elevatis.*

By the addition of "mala" to the erroneously cited figure of Gualtieri, our author has virtually repudiated it. "Spinosa" followed "Pruni;" the fallacious "s. rubris" was not present, nor "sæpe" either; "antere" stood in the place of "postico," and "postico" in that of "antico." The

descriptions of the "rima" and "anus" have been added: "recurvati" and "fossula distincti" were amplifications.

C. UNEDO. *Buc. subcordatum, sulcis lunulis coloratis.*

C. MURICATUM. *Buc. subrotundum sulcatum, lateribus muricatis.*

C. MAGNUM. *Buc. oblongum, sulcis angulatis latere serratis.*

I had hoped to have found the 19 a misprint, but the MS. and the printed copy agree precisely in every particular.

C. FLAVUM. *Buc. subovatum sulcatum, latere altero scabrum, altero dentatum.*

The redundant "subovata" was not in the copy, where the remark was made that the species resembled the shell subsequently termed *Chama cor*, the figure of which (Gualt. t. 71. f. E.) had been cited, but erased in the MS. The ideal hence derived is a very different shell from the one supposed identical. No mention is made of lateral teeth: was it then a veritable *Cardium*?

C. LÆVIGATUM. *Buc. ovatum, striis læviusculis longitudinalibus.*

I do not consider this (the *B. striatum* of the MS.) to be identical with the *C. lævigatum* of the 'Systema.'

C. SERRATUM. *Buc. ovale læve, antice serratum.*

"Ovata" stood in the place of the printed "obovata": "curvatus" and "parvi" were subsequent to the MS.

C. TRISTE. *Buc. ovatum læve, rima anoque obsolete striatis.*

The 'Museum' was referred to for this shell previously to the publication of the details. Curious to relate, the species was wholly omitted in the twelfth edition of the 'Systema.' It was, in all probability, a *Mactra*, which genus had not been constituted at the period when the description of *C. triste* was issued.

C. PECTINATUM. *Buc. subcordatum, striis hinc longitudinalibus, illinc transversalibus.*

The erroneous reference to Gualtieri was not present in the written copy.

Mention was made in the 'Systema' of a *Solen bullatus*, for a more detailed account of which the reader was referred to the 'Museum Ulricæ.' No such species appeared in the published edition; but the omitted shell (a veritable *Cardium*) was thus described in the unprinted version:—

BUC. BULLATUM. *B. subrotundum, antice crenato-hians.*

Rump. 143. t. 44. f. N. *Pecten bullatus.*

Testa subrotunda, inflata, gibba, fragilis, pellucida, substriata, rufo nebulosa, antice hians, margine serrato. Umbones tumidi, obtusi, reflexi. Rima minima brevissima. Ani regio obsoleta. Dens cardinis fere unicus, minimus. Marginales solitarii, remoti, compressi, majores.

#### DONAX.

TRUNCULUS was the proposed name of this genus, which was thus characterized:—

Testa compressa, antice obtusissima, retusa. Cardinis dentibus 2, marginis unicus.

D. SCORTUM was wisely omitted.

D. PUBESCENS. *Trun.* antice spinis ciliatus.

D. RUGOSA. *Trun.* antice rugosus, marginibus crenatis.

The printed "cuneiformis" has replaced the earlier "majuscula"; and "crenulatis" was originally "undulatis." "Intus subviolacea est" was not in the written copy.

D. TRUNCULUS. *Trun.* antice lævis, marginibus crenatis.

The reference to Klein was not in the original, but "d'Arg. t. 25. f. L." was quoted (as in the twelfth edition of the 'Systema'). The last seven words printed were not in the copy. The intended name was *gibbus*.

D. CUNEATA. *Trun.* cuneiformis, marginibus integerrimis.

The final remark was not in the copy, where "parva, ovata," preceded "cuneiformis." The then unpublished details were quoted in the 'Systema.'

D. SCRIPTA. *Trun.* ovatus lævis scriptus.

The erroneous citation of Gualtieri (a misprint for 88. f. Q.) was not in the copy, and, as the figure represents the *D. trunculus* in the page opposite, I suspect was carelessly placed here by the printer, when our author had inserted it in his revised proof. I suspect this error often occurred, as for instance in *Tellina planata* and *radiata*, where Gualtieri's figure (added during revision) was attached to the former instead of to the latter. "Margo interne crenulatus," and nearly the entire account of the teeth, were emendations.

D. MURICATA. *Trun.* ovatus, striis muricatis, margine denticulato.

"Postice solitarii" followed the final "utrinque": "primores" was an emendation.

## VENUS.

This genus (as a whole) was not to be found in the manuscript System. Its components were distributed into three groups, two of which bore names that were subsequently allotted to forms very remote from those therein so designated.

CUNNUS. Testa subrotunda. Rima nymphis instructa. Dentes cardinis 4, lateralibus divaricatis versus latera. This contained the bulk of the *Veneres*, all except Nos. 63, 66, and those referred to *Pholus* and *Chama*.

PHOLAS. Testa lenticularis. Rima fissa, destituta nymphis. Dentes cardinis 1 s. 2, marginalis tantum intra anum. *V. Pennsylvanica*, *incrassata*, *punctata*, *edentula*, *exoleta*, *scripta*, *pectinata*, *ziczac* were its constituents.

CHAMA. Testa ovalis cum angulo. Cardo dentibus 4 confertis, quorum unus in singula valvula bifidus. In this were located *V. literata*, *rotundata*, *decussata*.

V. DIONE. *Cun.* cordatus, antice pubescenti-spinosus.

The same references to Petiver, Olearius, and Lister were present as in the 'Systema.' The final remark was an addition. The proposed name was *C. Veneris*.

V. MARICA. *Cun. subcordatus, decussatim striatus, pube lamellosa.*

V. DYSERA. *Cun. testa subcordata, sulcis transversis reflexis, labiis concavis incumbentibus.*

Neither "Huic rugæ, &c.," "lævis," nor the synonym of Lister were in the original.

V. CHIONE. *Cun. subovatus, lævis.*

The erroneous reference to d'Argenville was not inserted in the MS., from which "lanceolatis," likewise, was absent.

V. MACULATA. *Cun. testa ovato-cordata lævis.*

"Lanceolata" and "ovato-oblongus" have been additions. The observation that it was difficult to distinguish this shell (which was not named in the MS.) from the following, would mislead one, since the remark referred to two unpublished species, which it originally preceded.

V. MERETRIX. *Cun. subcordatus glaber, labris gibbis, nymphis apice hiantibus.*

*C. vulgaris* was the name originally designed.

V. CASTRENSIS. *Cun. suborbiculatus glaber, characteribus scriptus.*

V. MEROE. *Cun. sutura postica hians.*

V. FIMBRIATA. *Cun. subrotundus decussatus rugosus, longitudinaliter striatus.*

D'Argenville was not referred to.

V. RETICULATA. *Cun. subcordatus, striis crenatis decussatis, ano cordato.*

V. TIGERINA. *Cun. suborbiculatus, striis crenatis decussatis, ano ovato.*

The name was an error, having been derived from the "Lingua tigrina" of Rumphius (his figure G., not H.): *fuliginosus* was the one originally intended.

V. PROSTRATA. *Pho. orbiculata, transverse striata, labiis scabro-membranaceis.*

The unpublished details had been previously referred to in the 'Systema.'

V. PENNSYLVANICA. *Pho. glabra, rugosa, antice sulco longitudinali.*

"Habitat in Pennsylvania," and "subdiaphana," were the unprinted additions. The "margo interne crenatus," "nates sub-recurvatæ," and "color intus versus marginem violaceus," were not in the copy. The last character (so utterly inappropriate to the features of *Lucina P.*) was, I suspect, intended for *punctata* on the page opposite.

V. INCRUSTATA. *Pho. glaberrima lævissima, punctis excavata.*

The details were referred to in the 'Systema' before their publication.

V. PUNCTATA. *Pho. longitudinaliter sulcata.*

The G in the reference to Rumphius was a misprint for the written D, from which figure ("Chama pectinata") our author had proposed to borrow the specific name, but subsequently had preferred the published designation. "Klein, 147. *Actinobolos æquilatera*" has been added to the MS. by Linnæus.

V. EXOLETA. *Pho. decussatim striata.*



The original synonymy and details have been so transmuted in the press, that it is manifest that the amended (!) species was perfectly distinct from the shell originally designed. The name of the latter was *clathrata*, and the declared sculpture was not merely "transversim," but "et longitudinaliter" likewise (in place of "striis retrorsis"). The reference (added by Linnæus) was not to Gualtieri, but to Lister, 335, f. 172, and its copy in Klein (t. 10. f. 52), both which would have more appropriately been assigned to *V. reticulata*. The *V. exoleta* having been previously defined in the 'Systema,' this confusion becomes of little importance.

*V. ZICZAC.* *Pho.* striis transversis membranaceis erectis.

The number which indicates the position of this species in the 'Museum' has been subsequently ('Syst.' ed. 12) referred to *V. cancellata*, yet, judging from the generic appellation (and consequent dentition), it could scarcely have been that well-known species. The "lentiforini" of the 'Systema' (ed. 10), where the name *ziczac* first appeared, forbids the annexation; but, although the details of the 'Museum' were there referred to, the obnoxious word was not mentioned in that publication. The following are the printed emendations (?): "lævis, et quasi excisa," "compressa," "variat colore albisimo."

*V. PECTINATA.* *Pho.* sulcis longitudinalibus nodosis, antice antrosum ramosa.

The additional synonym of "Gualt. D. 75, f. A." appears in the MS., where "quam reliquæ" follows "orbiculata," and in place of "In area antica" may be read "et a primo sulco." The details there terminate with the word "lanceolatum." "*Ramosa*" was the intended name.

*V. SCRIPTA.* *Pho.* striata, postice angulo recto circumscripta.

The incorrect figure of d'Argenville was not indicated.

*V. EDENTULA.* *Pho.* subgloboso-lenticulata rugosa edentula.

*V. LITERATA.* *Cha.* transversim striato-ovata.

The earlier reading of confertim was "profunde"; "striis crenulatis antice et postice," "lanceolata," and "tres s." were absent.

*V. ROTUNDATA.* *Cha.* transversim striata ovata absque angulo.

The printed additions are "varius in variis," "aut albis," "lanceolata," and the final remark. There was no name attached in the MS.

*V. DECUSSATA.* *Cha.* testa ovata, decussatim striata.

"Sæpe" and "minimus" are the sole printed additions.

Probably the *V. Phryne* of the 'Systema' was designed by the following unpublished description:—

*CUN. VENOSUS.* *C.* subcordatus lævis lateribus rugosis. Testa cinerea, nuce coryli major, gibba, glabra, antice et postice transversim sulcata. Margo exterius tantum denticulatus, non vero apex externus, aut margines laterales.

The *V. macrodon* answers fairly enough to this definition.

## SPONDYLUS.

This very natural genus was confused with *Chama*, and thus characterized :—

Testa imbricata. Cardo e callo gibbo oblique inserto fossula obliqua.

S. GÆDEROPUS. *S. imbricatus auritus*, cardine dentato.

"Rumph. t. 48. f. 1," "Gualt. t. 99. f. E. F. G," "Bonan. 2. f. 21," "Rondel. c. 40. p. 41," were the additional synonyms of the MS. The "ad cardinem truncata" was an emendation for the previous "breviore": the "superiore" a misprint for the written "inferiore": the final remark was not present.

S. REGIUS. *S. spinosus sulcatus inauritus*, cardine dentato.

No name was attached to this species: the previous one had been termed *Pectinites*.

S. PLICATUS. Not mentioned in the manuscript.

## CHAMA.

The members of this genus were included in *Spondylus*, except *cordiformis*, which was referred to *BUCARDIUM*.

C. GIGAS. *Sp. plicatus squamosus*, ano hiantie crenato.

The species as originally defined was more comprehensive in its details than when printed; for the restricting "decussatim" had not been added, and "Gualt. t. 93. f. B." was an additional synonym. The printed additions were "obsoletis," "Margine reflexo," "exteriore duplicato longiore," and the final remark. *S. imbricatus* was the intended name.

C. HIPPOPUS. *Sp. plicatus muricatus*, ano retuso clauso dentato.

"Arg. t. 26. f. II." was an additional synonym of the MS.: the printed 20 should have been 10, as written: "ut in præcedente" was an emendation: *S. asper* was the proposed name.

C. LAZARUS. *Sp. imbricatus*.

Seba was not cited: "obliquam" followed "fossam" in the MS. "Elevatis," "longitudine testæ," "productiore," "instar auris," formed no portion of the early description.

C. ANTIQUATA. *Sp. subcordatus*, sulcis perpendicularibus transversim striatis.

No name was attached to the original details, which appear to have been altered ("in aliis minimum cordatum impressum fuscum"), and the synonym of Bonanni added, in order to comprise that species (*Cardita sulcata*) which had been pictorially defined in the 'Systema.' "Gibba" was preceded by "admodum": "obsoletis" was not present. *Cardita bicolor*, var. *unicolor* was probably intended.

C. SEMIORBICULATA. *Sp. semiorbiculatus compressus*, decussate striatus, rudis.

"Interior" was the earlier reading of "primarius."

C. CORDATA. *Sp. cordatus*, transversim striatus, hinc elongatus, compressus.

*C. OBLONGA.* *Sp. oblongus, antice angulatus, dentibus anticis acutis.*

"Unico" (error for "unicus") originally preceded "in altera valvula."

*C. CORDIFORMIS.* *Buc. subrotundum læve, umbonibus recurvatis.*

The brief description in the 'Systema' had evidently been copied in the manuscript by our author himself, who cited Gualt. t. 71. f. E. as the sole synonym. The specimen had apparently been added to the collection, subsequently to the drawing up of the first catalogue.

#### ARCA.

*Testa crassa, umbonibus distantibus intus fornicatis. Cardo planus, masticatus dentibus numerosis minimis æqualibus transversis.*

*A. TORTUOSA.* *A. oblonga obliqua, valvula altera oblique carinata.*

"Nates, &c." and "Cardo, &c." were the printed additions to the earlier description. The 'Systema' synonyms of Klein (t. 8. f. 16) and Bonanni (2. f. 128) were present in the manuscript.

*A. NOÆ.* *A. oblonga angulata hians.*

This manuscript furnishes us with the additional synonyms of

"Aldrov. 3. p. 513." and "Sloan. Hist. 2. p. 257. *Musculus Matthioli*," besides the previously published references to Lister (368. n. 208) and Bonanni (2. t. 32). The formation of the hinge was not, however, indicated, and the passage commencing with "Nates" has been enlarged from "*Umbones remotissimæ, area interjecta concava, ad angulum rectum striata. Margo exterior in medio hians, apertura barbata.*"

The intended specific epithet was *A. Noemi*.

*A. ANTIQUATA.* *A. testa oblique cordata, transversim sulcata, antice angulo compresso, rima intra rhombum transversim striata.*

The admixture of two species (at the least) in the published edition resulted from the amalgamation of two earlier descriptions. To the above diagnosis belonged the printed details with the following important changes. In place of "*extus striata longitudinaliter sulcis crenatis*," the reading was simply "*intus striata longitudinaliter*," and in lieu of "*interjecto spatio rhombeo plano*," merely "*rima patens*."

The proposed name for this shell, from a supposition of its identity with the *Pecten virgineus* of Rumphius, was *A. virginea*. The other species which Linnæus referred to the same numerals of the 'Systema' was not named, but was thus characterized:—

*A. (Sys. n. 141).* *A. cordata, sulcis nodosis, rima decussatim striata.*

*List. Hist. . . . . Pecten polypleptoginglymus, &c.*

*Gualt. t. 87. f. C.*

*Testa reliquis magis gibba, albido-flavescens, sulcis xxx obtusis, transversim nodosis: nodis transversis, obtusissimis, imbricatis. Intus albida. Margo dentibus xxx argutiusculis. Rima sulco rhombeo circumscripta, disco decussatim vix manifeste striato. Umbones distantes ad neutrum latus flexi.*

*A. SENILIS.* *A. oblique cordata, octosulcata, lævis, antice hians, rima obtusangule striata.*

Lister (without numerals!) was referred to in illustration; the early unimproved account of the beaks and ligamental area ran as follows: "Umboes distantes, oblique incurvati. Rima hians striata transversim ad angulos acutos": "et profunde immersis" was an addition.

A. GRANOSA. *A. subcordata, sulcis muricatis, rima obtusangule striata, utrinque angulum formante.*

The name was evidently borrowed from Rumphius, whose *Pecten granosus* ("143. t. 44. f. K.") was referred to in the manuscript, though neither quoted in the printed copy nor in the 'Systema' (ed. x.). "Bonan. 2. n. 73," and Lister (without numerals) were also cited.

A. DECUSSATA. *A. lenticularis, decussatim substriata, apicibus reflexis.*

For a detailed account of this shell, to which no specific name was attached in the MS., the 'Museum Ulricæ' was referred to, previous to its publication.

A. PALLENS. *A. lenticulari-subobliqua, decussatim striata, rima brevi.*

This was the type referred to in the 'Systema.'

A. PECTUNCULUS. *A. lenticularis sulcata, decussatim rugosa.*

"Arg. t. 27. f. B," and Lister without numerals appended, were the unpublished synonyms. The expressions "leviter," "exteriore tenui; sulcata," "in arcum," were not parts of the original copy, which contained, however, the unprinted paragraph "latere interiore margine prominente notato." There was no specific name attached to either this or the next species.

A. GLYCIMERIS. *A. lentiformis, transversim substriata, rima lævi.*

The '*Chama glycimeris Bellonii*' of Lister (t. 247) was an unprinted synonym.

The following suppressed description of an unnamed Ark that was allied to, if it were not, *fusca* or *barbata*, was found in the manuscript. The 'Museum' had been referred to in the synonymy of the latter in the 'Systema,' but the species was not mentioned in the published version.

*Arca ovalis, compressiuscula, apicibus subcontiguis.*

Testa rudis, ferrugineo-fusca, longitudinaliter striata, striis quasi ex punctis callosis concatenatis, alternis striis majoribus ovatis, parum obliqua, minus lateribus gibba, rotunda absque angulis. Margo æqualis, edentulus. Apices recurvi fere tangunt se invicem. Rima dentibus minutissimis, antice longius extensa, nec recta.

## OSTREA.

The very natural genus *Pecten* was separated from the unsymmetrical oysters, with the following definition:—

PECTEN. Testa subrotunda, altera planior, basis transversa, anguli transversi (auriculæ) ad basin. Cardo cavitas conica, striis utrinque 3 longitudinalibus obliquis.

The genus OSTREUM, enlarged by the addition of the true oysters confounded with the *Mytili*, the *Meleagrina*, *Aviculæ*, and the *Anomia placenta*, was thus characterized:—

O. MAXIMA. *Pec. radiis 14 rotundatis longitudinaliter striatis.*

In place of Gualtieri, "List. Ang. 184. t. 5. f. 29. *Pecten maximus*," and "Faun. Suec. 1343" were referred to: these synonyms had been added subsequently to the description.

O. JACOBÆA. *Pec. radiis 14 angulatis, fornicis longitudinaliter striatis.*

The cited drawing of Gualtieri was not mentioned.

O. ZICZAC. *Pec. radiis 18 explanatis.*

No specific name was attached to this, the preceding, and the next two species.

O. STRIATULA. *Pec. radiis 16 oblitteratis, transverse membranaceo-striatis, margine integerrimo.*

O. MINUTA. *Pec. radiis 20 convexis.*

O. PLEURONECTES. *Pec. radiis 12 duplicatis, extus lævis.*

O. OBLITTERATA. *Pec. radiis 24 duplicatis, extus lævis.*

O. RADULA. *Pec. radiis 6 convexis decussate striatis, margine crenato, auriculis æqualibus.*

O. PLICA. *Pec. radiis 16 convexis læviusculis, decussato-striatus.*

No specific name was appended to either this, the next, or the two preceding species.

O. PALLIUM. *Pec. radiis 12 convexis, striatus, scaber, squamis imbricatus.*

This with the remainder of the *Pectens* (as far as *flavicans*) formed a group characterized by "Auricula altera intus ciliato-spinosa."

O. NODOSA. *Pec. radiis 9 nodoso-vesicularibus.*

O. PES-FELIS. *Pec. radiis 9, lævis, fornice squamis fornicatis.*

The printed diagnosis, or heading, was evidently drawn up from a different shell.

O. PELLUCENS. *Pec. radiis 9, lævis, fornice squamis cochleari-hemisphæricis.*

No name was attached to this or the next shell.

O. SANGUINEA. *Pec. radiis 22 scabris, semiauritus.*

The reference was not to plate 74 (as printed) of Gualtieri, but to plate 73. "*Purpureus nigro undatus*" was written after the indicated colouring.

O. VARIA. *Pec. radiis 30 scabris explanatis.*

"Et omnia eadem" followed "*sanguineæ*"; "*striis compressis echinatis*" was not present; "*color pallidior*" was in the place of "*concolor*."

O. PUSIO. *Pec. radiis 40 filiformibus.*

O. GLABRA. *Pec. radiis 10 lævibus planiusculis, internis striis elevatis duplicatis.*

Gualtieri's rude drawing was not quoted.

O. OPERCULARIS. *Pec. radiis 20 subrotundis, decussate striato-scaber, operculo convexiore.*

O. GIBBA. *Pec. radiis 20 glabris, gibbus.*

Brown's drawing was not quoted.

O. FLAVICANS. *Pec. radiis 8 striatis, margine altero rotundato.*

As in the 'Systema,' the next two shells, along with this, formed a group distinguished as having the "*Valvulis altero latere magis gibbis*." No

names had been appended to this, the three preceding, and the two following species.

*O. FASCIATA.* *Pec. radiis 20, auriculis æqualibus exoletis.*

The "gibba" of the borrowed diagnosis was not, it may be observed, in the original.

*O. LIMA.* *Pec. radiis 22, imbricatis squamis, altero margine rotundato, auriculis oblitteratis.*

The "gibba" of the borrowed heading was not in the original diagnosis. The final remark was likewise absent.

*O. ISOGNOMON.* The entire account of this species was added to the copy in the Linnean handwriting. "Klein, 128. t. 8. f. 15. Isognomon" and "Cardo ut ephippo" had been omitted in printing.

*O. MALLEUS.* *O. trilobum.*

"Transverso ad marginem" was a subsequent addition.

*O. FOLIUM.* *O. ovatum, lateribus obtuse plicatum.*

Klein's copy (t. 8. f. 22.) of the indicated figure in Rumphius was cited, in the handwriting of Linnæus: "the "cavitate conica" was an emendation.

*O. EDULE.* *O. subrotundum semiorbiculatum, valvula altera plana integerrima.*

There was no semicolon after "opaca," but a comma after "latiore." The original sole synonym was the omitted one of "Gualt. t. 102. f. B."

*O. SEMIAURITUM.* *O. semiauritum ovatum læve, basi obliqua.*

Linnæus himself had added this species to the earlier catalogue.

*O. EPHIPPIMUM.* *O. submembranaceum curvum, cardine octosulcato.*

In addition to the published *Ostreæ*, the following description of the shell subsequently termed *O. perna* (Syst. ed. 12.) was found in the manuscript:—

*O. rugosum, inæquale, tumidiusculum, cardine octoerenato.*

Testa perniformis, obovata, substantia ligni antiqui, tumidiuscula, superficie obsolete rugosa, inæquali, interne livida. Cardo transversus, margine inflexo, notatus crenis obtusis circiter 8.

## ANOMIA.

The single species here mentioned was comprehended in *Ostreum*.

*A. PLACENTA.* *O. orbiculatum planum pellucidum.*

Reference was made, by a long periphrasis, to plates 225, 226 of Lister's 'Historiæ'; Seba was not quoted: "intra discum testæ adnatis" was absent.

## MYTILUS.

Testa opaca, læviuscula. Cardo nullis dentibus instructus, sed fossula obliqua intra marginem.

This definition very properly excluded the oysters which had been erroneously inserted in this genus. Only the *Mytili* and *Modiolæ* of Lamarck were left as members; for *margaritiferus* and *hirundo* were transferred to *Ostreum* !!

M. FRONS. *Ost. acutum plicatum, labio altero scabro.*

M. CRISTA-GALLI. *Ost. acutum, plicatum, labio utroque scabro.*

The reading of the MS. was not "secundum marginem insculptus," but "secundum marginem Mytilus."

M. HYOTIS. *Ost. subacuto-plicatum imbricatum squamis compressis, labio utrinque glabro.*

M. MARGARITIFERUS. *Ost. semiauratum, imbricatum tunicis, basi transversum.*

"Bonan. 2. f. 1." was the omitted synonym. The description of the hinge was not at first inserted.

M. UNGUIS. *M. subrotundus, longitudinaliter striatus, pellucidus.*

This ambiguous species was not named, but placed next to *Ostrea edulis*. I entertain but little doubt of its being a young *Perna*.

M. LITHOPHAGUS. *M. cylindricus.*

Neither Gualtieri nor d'Argenville was referred to, which confirms my idea that the species of the 'Museum' (termed *coriaceus* in the manuscript) was not the Mediterranean *Lithodomus*.

M. BILOCULARIS. *M. striatus, cardine fornicato.*

M. EXUSTUS. *M. striatus, dorso angulato.*

M. EDULIS. *M. lævis, subenervatus, cardine terminali mutico.*

The printed synonyms are additions. From the "crassa," and the "absque denticulo," it is by no means improbable that some large exotic species was intended. The proposed name was *niger*; and that word originally formed part of the heading, but had been erased by Linnæus.

M. UNGULATUS. *M. lævisculus, valvis obliquis postice dilatatis, antice apice.*

"Lineis" was "tunicis" in the original. I do not consider that the details of this species (the *M. rusticus* of the MS.) pertain, even generically, to the *ungulatus* of the 'Systema.'

The large *Mytilus* represented by Gualtieri was not quoted: the reference, on the contrary, was to the two *Modiolæ* depicted by Rumphius ("Rump. 151. t. 46. f. B. C.") and to their Kleinian names ("Klein, 127. *Musculus acutus vulgaris, a. b.*"); and to that genus, rather than to *Mytilus*, does the account of the suture, and the final remark, apply.

M. MODIOLUS. *M. lævis, cardine sublaterali, margine dorsali dilatato.*

The erroneous, yet approximate, synonyms of Rumphius and Gualtieri (the 4 H's of whose engraving represent 4 different shells) were not quoted in the original. The species (for want of a good figure) was not clearly defined until the twelfth edition of the 'Systema.'

M. VIRIDIS. *M. lævis membranaceus, cardine terminali.*

M. RUBER. *M. rugosus, valvulis obliquis, postice dilatatis, margine antico apicem æquante.*

The preceding mussel spoken of was not *viridis*, but *ungulatus*. The reading was not "brevissimo, compresso," but "brevissime compresso."

M. HIRUNDO. *Ost. valvis bilobis, lobo anteriore angustiore longiore.*

"Bonan. 2. f. 57" (error for 58) and "List. 220. f. 55" were quoted.

## PINNA.

The definition was not precisely similar in words to that of the 'Systema,' but the sense varied but little. It ran as follows:—

Testa oblonga, membranaceo-fragilis, basi angustata. Cardo nullus, sed valvis altero latere coadunatis ut una appareat.

P. RUDIS. *P. rugosa squamis fornicatis per seriem digestis.*

The name of this shell, identified (I think wrongly) by our author with the one he had termed *rudis* in the 'Systema,' was originally *fornicata*.

P. NOBILIS. *P. squamis canaliculato-tubulosis subimbricatis.*

P. MURICATA. *P. striata, squamis concavis ovatis acutis.*

"List. Hist. t. 370. no. 215," and "Sloan. Hist. i. p. 254," were present among the original synonyms.

P. ROTUNDATA. *P. squamis obsoletis, testæ margine rotundato.*

P. SACCATA. *P. nuda saccata erectiuscula.*

P. DIGITIFORMIS. *P. nuda digitiformis incurva.*

P. LOBATA. *P. nuda lobata.*

In addition to the printed species, an anomalous *Pinna*, which I doubt not was the *Lingula anatina*, is here described.

P. VIRIDIS. *P. ovalis, basi compressa.*

Generis dubii huc relata, donec certiora determinentur.

Testa utraque ovali-oblonga, viridis, intus magis pallida; quasi compressa, et fere naviculata, acutior.

## ARGONAUTA.

The intended name of this genus was *Cymbium*, the one applied to it by Gualtieri.

A. ARGO. *Cym. carina dentata.*

"Bonan. l. f. 13," and "Klein, 3. t. 1. f. 3," were the unprinted synonyms. The intended specific epithet was *C. papyraceum*.

## NAUTILUS.

There was no definition of either this, or of the preceding genus, in the written catalogue.

N. POMPILIUS. *N. apertura cordata, anfractibus contiguus.*

The unprinted synonyms were "Bonan. l. f. 1, 2," "Breyn. Polyth. 14," "Pet. Amb. t. 3. f. 7," "Pet. Gaz. t. 99. f. D," "Klein, 2. t. 1. f. 1, 2," and "Bellon. Aquat. 318. t. 382." Seba was not quoted.

N. SPIRULA. *N. apertura orbiculari, anfractibus distantibus.*

The I in the reference to Rumphius was a misprint for the written l; "Bon. l. f. 39," "Breyn. Polyth. 21. f. 2," "Klein, 5. t. 1. f. 6," and "Petropol. Mus. 532. n. 6," were the unprinted synonyms: "tubo" was an emendation.

## CONUS.

Testa oblonga, cylindrica, deorsum attenuata. Apertura longitudinalis. Labium edentulum. Os non reflexum. Columella integra.

This most natural genus had the precise limits ordinarily assigned to it.

C. MARMOREUS. *C. conicus fuscus, maculis ovatis albis.*



"Bonan. 3. f. 123" was an additional synonym; the "versus basin transverse striata," and "subtruncata, apice prominulo," with the account of the variety, were not found in the MS.

*C. IMPERIALIS.* *C. pictus fasciis flavis cingulisque linearibus albo fuscoque articulatis.*

The "obconica" was simply "conica"; there was no description of the spire.

*C. LITERATUS.* *C. conicus albus punctis fuscis.*

The spire was not described: the reference to d'Argenville was I, not Q.

*C. VIRGO.* *C. striis convexis lævibus, basi cærulescente.*

"Longa" was originally "magna": the erroneous reference to Gualtieri was not inserted.

*C. CAPITANEUS.* *C. conicus, basi fusca, spiræ anfractibus adscendentibus.*

At least two species were confused; but, from the heading, it is clear that *C. generalis*, rather than *C. capitaneus*, was the typical form: the latter was the variety *g*.

The V in the reference to Rumphius was a misprint for the written Y: "Gualt. t. 20. f. G." and "Pet. Gaz. t. 27. f. O." were additional synonyms. "Notata lituris undatis fuscis" was not in the manuscript.

*C. PRINCEPS.* *C. flavus, lineis fusco-purpureis longitudinalibus ramosis.*

"Sub" preceded "convexa."

*C. AMMIRALIS.* *C. basi punctato-scaber.*

After "summus" was written "cingulo albo"; after "ordinarius," "cingulo nullo"; Seba was not quoted; "pruniformis" was the earlier reading for "conico-convexa, pyriformis." The variety *a*. was described as "circumdata lineis numerosis albis nigro articulatis, quarum quæ cylindrum distinguit a spira latior maculis albis nigrisque majoribus alternantibus." The variety *g*. was not originally present in the catalogue, but was interpolated by Linnæus. "Hæc pretiosissima ut vendita fuerit 500 florenis" was the final remark.

*C. NOBILIS.* *C. subcylindricus lævis glaber, spira acuta argute canaliculata.*

"Cacumen" was a misprint for the written "acumen."

*C. GENUANUS.* *C. pictus cingulis linearibus albo fuscoque articulatis.*

A strange confusion took place between the details of *C. senator* and *C. Genuanus*. The published description belonged to the former, the synonym to the latter, and should have preceded the following brief description:

"Testa conica, pallida, glauca, oblongiuscula. Lineæ 19 transversæ fusco-nigræ s. purpurascens albo interruptæ, alternæ sæpe angustiores. Spira subconica, obtusa."

*C. GLAUCUS.* *C. emarginatus, basi striatus, spiræ inermis anfractibus convexis.*

*C. MONACHUS.* *C. gibbus acutus, fusco-cærulescente nebulosus, basi striatus.*

Bonanui was not quoted in the written copy.

*C. MINIMUS.* *C. cinerascens*, punctis oblongis cinctus.

The original description has been much altered by Linnæus. It ran as follows: "Testa ovata, glauco-cinerea, gibba, striæ transversales plus 30 punctis fuscis oblongis. Spira convexa, alba, maculis fuscis magnis transversis." The cited figure does not even suit these meagre characteristics, which might have been equally applied to *C. glaucus*.

*C. RUSTICUS.* *C. ovatus*, basi rugoso-scaber, spira conica convexa.

The variety was not noticed, and d'Argenville was not quoted in the original catalogue. "Flavo et glauco" should have been "flavo aut glauco," as written.

*C. MERCATOR.* *C. ovatus*, albus fasciis reticulatis flavis.

*C. BETULINUS.* *C. submarginatus*, basi rugosus, spira planiuscula mucronata.

Seba was not cited.

*C. FIGULINUS.* *C. emarginatus*, basi rugosa, spira convexa acuta.

An additional synonym, "Rump. t. 31 (error for 33, there being no number 1 in that plate) f. 1," was indicated.

*C. EBRÆUS.* *C. ovatus* albus fasciis nigris ex maculis transversis.

"Pet. Gaz. t. 99. f. 12." was quoted.

*C. STERCUS-MUSCARUM.* *C. emarginatus*, basi striatus, spiræ anfractibus canaliculatis.

Of the two species confounded under this designation the *C. arenarius* appeared as a variety in the manuscript. Of the typical form "Spira lævi," "Pet. Gaz. t. 75. f. 1," and "Rumph. Mus. t. 33. f. Z," were cited as illustrations; the other synonyms were ascribed to "Var. a. coronatus spinis obtusis." The colouring was not mentioned.

*C. VARIUS.* *C. scabro-coronatus*, elongatus, spira coronata acuta.

*C. GRANULATUS.* *C. scaber inermis*, striis lævibus.

The original size indicated was "magnitudine coryli."

*C. MAGUS.* *C. subcylindricus*, fasciis longitudinalibus albo punctatis.

The erroneous figure of d'Argenville was not referred to; and the 32, Q (as in the 'Systema'), not 34, A, of Rumphius was quoted as illustrative. The final remark had been interpolated by Linnæus.

*C. STRIATUS.* *C. ovato-oblongus* gibbus nebulosus, striis tenuissimis parallelis fuscis.

The "Cæterum testa minus ante convoluta est," is a press addition. "Pet. Gaz. t. 98. f. 9." was correctly cited.

*C. TEXTILE.* *C. pictus* venis reticulatis luteis, maculis luteis fuscisque.

The intended name (*C. drador*) was an amusing specimen of conchological Latin: it was of course borrowed from d'Argenville's appellation of "*Drap d'or*." "Columella ad postica quasi replicata est" was added in the printing; the "luteo" was originally "albo"; the "subconica" was "anfractibus subconicis"; and there was no mention of a variety.

*C. AULICUS.* *C. pictus* venis reticulatis fasciisque longitudinalibus interruptis fuscis.

"Columella postice replicata est," and the objectionable "obovato-sub," were not in the copy. No figures were cited in the original catalogue.

*C. SPECTRUM.* *C. cærulescens, flavo-nebulosus, punctis striisque alboluteis.*

The original description did not comprise those characteristics which are so much at variance with the essentials of the *C. spectrum* of authors. The following passages were omitted: "gibba, minus arcte convoluta" (this replaced "conica"), "Columella postice striata et replicata. Intus testa sub-cærulescens," "mucrone cingulis granulato."

*C. BULLATUS.* *C. flavus, albo nebulosus.*

The account of the variety, and the "vix tuberculata," were absent from the manuscript.

*C. GEOGRAPHUS.* *C. oblongus gibbus coronatus.*

The Rumphian name was the one attached to this species in the written copy.

*C. TEREHELLUM.* *C. scaber inermis, striis tuberculatis.*

The synonyms attached to the published details were "Gualt. Test. t. 25. f. L.—Arg. Conch. t. 16. f. P.—Rumph. t. 33. f. EE." Now these harmonize with both the heading and the description, and clearly indicate the *C. Nussatella* of the 'Systema'!

The details attached to the published synonyms (which latter belonged to the *C. terebellum* of the 'Systema,' and to which were joined "Gualt. t. 23. f. O.—Bonan. 3. f. 57.—Pet. Amb. t. 13. f. 24," ran as follows:

"Testa cylindræa, glabra, antice angustior, desinens in spiram attenuatam, anfractibus 3. Basis truncata, tenuis. Columella non torta, sed involuta. Color pallidus."

#### CYPREA.

Testa ovata lævis involuta. Apertura linearis, utrinque dentata. Spira occultata intra testam.

*C. MAPPA.* *C. subturbinata characterisata, macula longitudinali dentata.*

"Pet. Amb. t. 16. f. 2." was an omitted synonym. The terminal remark is an improvement upon the earlier "Noscitur linea utrinque dentata in superficie scripta."

*C. ARABICA.* *C. subturbinata characterisata, macula longitudinali simplici.*

"Denticulis testaceis" and the description of the variety were additions by the hand of Linnaeus.

*C. ARGUS.* *C. subturbinata subcylindrica, maculis annularibus.*

The synonyms of Petiver (t. 97. f. 6) and Bonanni (f. 263), quoted in the 'Systema,' were also present in the MS., where "2. s. 1" was in the place of "duabus." The "pallidis" was a misprint for the written "pallidæ." The account of the variety was subsequent to the copy.

*C. TESTUDINARIA.* *C. obtusa cylindrica, extremitatibus depresso.*

"Pet. Amb. t. 8. f. 7." was an unprinted synonym.

*C. CARNEOLA.* *C. subturbinata pallida, fasciis incarnatis.*

C. TALPA. *C. subturbinata violacea, fasciis pallidis.*

"Pet. Amb. t. 16. f. 1." was an unprinted synonym : "pallide flavescens" was the earlier reading for "testacea." The final remark was not in the copy.

C. AMETHYSTEA. *C. subturbinata, dorso violaceo.*

Rumphius was not originally cited as illustrative.

C. VANELLI. *C. subturbinata, maculata punctis lutescentibus.*

"Obsoletis" was originally in the place of "acutis": the "sæpe lutescentibus" was an addition of the press. *C. Ovum Vanelli* was the intended designation.

C. LOTA. *C. subturbinata alba, denticulis subulatis.*

C. FRAGILIS. *C. subturbinata gibba fragilis, obsolete fasciata.*

Linnaeus himself inserted this heading, with the first three lines of the printed details, in the manuscript copy. Neither the reference, nor the longer account of the variety (evidently a different species) appeared there.

C. CAPUT-SERPENTIS. *C. obtusa triquetro-gibba, postice obtusiuscula.*

"Fusis" was the earlier reading for "confertis."

C. MAURITIANA. *C. obtusa triquetro-gibba, postice depresso-acuta.*

"Pet. Gaz. t. 96. f. 8. ex Insula Mauritii" was added in the manuscript : "fuscus" was the earlier version of "fusco-testaceus."

C. VITELLUS. *C. subturbinata livida, maculis albis.*

The published reference was substituted for "Bonan. 3. f. 254," a more characteristic figure : "maxima ex parte distincta, sed" followed "Spira." "Albida," not "alba," was the tint at first ascribed to the base.

C. MUS. *C. obtusa subovalis gibba cinerea, fascia longitudinali fusca.*

Our author himself inserted the account of this species in the manuscript. Seba was not quoted. "Habitat in Carthagera" was appended to the description.

C. TIGRIS. *C. obtusa ovata, postice obtusa.*

In the synonym of Rumphius, 36 is a misprint for 38: the erroneous reference to the H of Gualtieri was not in the copy, where "Pet. Gaz. t. 96. f. 7" was indicated as illustrative. The printed additions were "aut alba," "fuseo-ferrugineis" (in lieu of "fuscis"), and "s. alba, quasi exarata; postice subcylindrica, truncata"; the previous words "Linea, &c." of that sentence were also absent from the original description, but had been inserted by the hand of Linnaeus. "Postice" preceded "planiusculo," and "subviolaceo" followed "nitore."

C. LYNX. *C. oblongo-ovata, lineæ flavescens, postice acutiuscula.*

No variety was mentioned in the written copy.

C. ISABELLA. *C. obtusa cylindrica, extremitatibus luteis.*

"Pet. Amb. t. 16. f. 16." was cited in the manuscript, where the final remark was wanting.

C. ONYX. *C. umbilicata, subtus fusca.*

Neither of the synonyms was quoted in the copy.

C. SUCCINCTA. *C. umbilicata, labio interiore utraque extremitate rotundato.*

The entire account of this shell (the *C. bicincta* of the MS.) was added to the copy by our author.

*C. ZICZAC.* *C. umbilicata, subtus lutea punctis fuscis.*

None of the cited figures were referred to in the original, where "interiore" stood in the place of the printed "utroque fusco."

*C. HIRUNDO.* *C. umbilicata, supra cærulescente.*

"Sparsis", "s. fusca", "necnon macula, &c." were emendations of the press: "postice" preceded "fere marginato" in the original.

*C. ASELLUS.* *C. umbilicata alba, fasciis tribus fuscis.*

"Pet. Amb. t. 16. f. 18." and "Pet. Gaz. t. 97. f. 11." were cited in the copy as illustrative.

*C. CRIBRARIA.* *C. umbilicata, maculis albis.*

"Margo" preceded "adscendens" in the copy, in which "livide flavo" was found in place of "luteo": "flavicantibus" was omitted. The intended name was *C. Argiolus*.

*C. ERRONES.* *C. umbilicata, macula testacea æquali.*

*Erratica* was the original specific appellation.

*C. MONETA.* *C. marginata-nodosa.*

"Pet. Gaz. t. 97. f. 8." and "Pet. Amb. t. 16. f. 8." were omitted in printing; "subflavescente" followed "convexo"; "subtus planiuscula" and "incisis" were absent. In place of the final remark (added, however, by the hand of our author), there originally stood "Noscitur tuberibus quinque elevatis."

*C. ANNULUS.* *C. marginata annulo flavo.*

The "s. rotundata" was added in printing.

*C. EROSA.* *C. marginata flava albo-punctata.*

"Undique aspersa" and "Macula fusca notat medium utriusque lateris" are the printed emendations.

*C. HELVOLA.* *C. marginata, postice crenata, subtus flava immaculata, supra albo punctulata.*

The final remark was unwritten, and the size not mentioned: "marginis gibbi" was "margine exteriore gibbo", and "subcrenati" was "latere subcrenato."

*C. STOLIDA.* *C. marginata variegata cinereo testaceoque.*

"Quinque" and "adspersis" were not in the original.

*C. OCELLATA.* *C. marginata lutea, ocellis nigris.*

*C. FLAVEOLA.* *C. marginata fulva, albo punctata.*

*C. PORARIA.* *C. marginata subviolacea, albo punctata.*

*C. PEDICULUS.* *C. transversim sulcata.*

"List. 168. t. 3. f. 17." and "Barr. t. 1326. f. 28." were cited in addition to the printed synonyms. The last four words of the description were not in the copy.

*C. NUCLEUS.* *C. sulcata punctata tuberculis, rostrata.*

"Pet. Amb. t. 16. f. 11." was cited as illustrative.

*C. STAPHYLÆA.* *C. punctis elevatis sine striis, subrostrata.*

The printed "minus" has been substituted for the earlier "vix";

"lutea" for "flava"; and "totam basin" for "maximam partem baseos."

C. GLOBULUS. *C. rostrata lævis*.

The printed additions were "alba s.", "extremitate utraque" (in place of "postice"), "Superficies punctis vix manifestis notata", and "excurrentes in strias".

#### BULLA.

Testa subrotunda, inflata, lævis. Apertura oblonga, non utrinque dentata. Spira obsoleta. Columella obliqua.

The *Murex fens* and *rapa* of the printed edition were originally located in this genus, from which *Auris Midæ*, *Auris Judæ*, and *achatiua* were excluded: the two former were placed in *Morion*, the last in *Buccinum*.

B. OVUM. *B. birostris*, labio dentato.

"Arg. t. 21. f. A." "Pet. Gaz. t. 94. f. 7." "Pet. Amb. t. 8. f. 6." were additional references in the written copy: "magnitudine ovi gallinacei", "apice et basi producta", were emendations during the printing. The "dilatata" was originally modified by a "parum."

B. VOLVA. *B. birostris*, rostris elongatis striatis.

"List. t. 711. f. 63" had been added to the copy by the hand of Linnaeus. The mode of reference (not, as in the earlier writings, by sections and chapters) evinces that this addition was, in all probability, subsequent to the publication of the work.

B. VERRUCOSA. *B. angulata*, aucta utrinque puncto osseo.

The correct synonyms of "Arg. t. 21. f. M." and "Pet. Gaz. t. 97. f. 22." were found in the manuscript: the printed emendations were, "magnitudine ovi passerini", "uti antierius", and "granis duobus" for the earlier "punctis."

B. GIBBOSA. *B. angulata*, cingulo elevato.

"Bonan. 249", "List. t. 711. f. 64", "Pet. Gaz. t. 15. f. 5", were cited in the copy: "præcedentis magnitudine", "solidiorque", with the modification of "cylindrica" by a preceding "sub", were press emendations.

B. NAUCUM. *B. rotundata* pellucida.

The size was not at first mentioned.

B. AMPULLA. *B. rotundata* opaca.

The printed "nulla" replaced the earlier "descendens, nuda", and "pallido-testacea" the written "albida." The "antice, nullus vero postice" was an emendation of the press.

B. PHYSIS. *B. spira* obtusa, lineis crispata.

"Sæpe", "hiansque", "tenue", and the name, are not to be found in the written copy: "apicem" was the reading for the printed "ventrem, adnatum."

B. AMPLUSTRE. *B. spira* elevata, fasciis incarnatis.

B. PALLIDA. *B. spira* elevata acuta, corpore cylindrico.

So very many changes has this puzzling species experienced in the works of our author, that it has been thought advisable to transcribe the written description from the manuscript copy:—

Testa ovato-cylindrica, glabra. Spira convexo-conica, mucronata. Columella multum torta. Color lividus, longitudinaliter griseo undulatus.

This evidently was a very different shell from the four-plaited, pale pink, and often variegated specimen described in the printed copy. The description of the outer lip, the name, and the terms "solida", "lævigata, obsoletior" were, likewise, additions of the press.

B. CANALICULATA. *B. cylindrica lævis, spiræ anfractibus canaliculatis.*

The entire account of this species was added to the manuscript in the Linnean handwriting.

B. ACHATINA. *Buc. glabrum, apertura integra.*

"Colum. Aphr. 18. t. 16" was the omitted synonym: "vel inæqualiter ovata" and the entire account of the base (merely described as "vix manifeste emarginata") were the printed additions.

B. AURIS-MIDÆ. *Morion ovali-oblongum, spira rugosa, labio interiore bidentato.*

Figure 122 of Klein's seventh plate was correctly quoted as illustrative: "crudæ" preceded "niger."

B. AURIS-JUDÆ. *Morion oblongus, spira lævi, labio interiore tridentato.*

B. SOLIDULA. *B. ovata opaca striata, spira elevata.*

I do not doubt, from the "ovata", that *Tornatella flammea* was the shell originally here intended; for the inharmonious account of the inner lip (as well as of the outer one) was not found in the manuscript,—from which, too, the erroneous reference to Bonanni was at first absent. The "acutiuscula" was "obtusiuscula"; the "postice rotundata, antice acuta" was an improvement upon the earlier "pone gibba."

B. LIVIDA. *B. spira elevata obtusa, corpore cylindrico.*

This heading makes no mention of the columellar plication of the shell so named in the 'Systema,' and confirms my surmise of their distinctiveness. The name *livida* was not originally attached to the description, but had been added (together with "obsoletis") by Linnæus, from a mistaken identification.

There has evidently been some error in the comparison with *Voluta Caffra*. I suspect that *Conus bullatus* was meant, as the contrasting characters answer admirably. "Differt a *B. pallida* et *livida*, quod testa solida—anfractus spiræ canaliculati". This passage shows that "fragilis et spiræ anfractus obtusæ" referred to *livida*, not to *Caffra*.

## VOLUTA.

Testa oblonga, subconvexa, basi emarginata, replicata in canalem recumbentem. Columella plicata oblique. Labio integro.

The genus appears to comprehend precisely the same members as in the published edition. They were arranged in sections exactly corresponding with the Lamarckian genera of *Oliva*, *Voluta*, *Mitra*, and *Marginella*.

V. PORPHYRIA. *V. spira basi oblitterata, labio medio retuso.*

Linnaeus spoils his excellent earlier description by his attempted emendations. The interpolated "*Faux sapius rufescens*" (misprinted *virescens*), and the reference to Gualtieri's figure *O. (O. erythrostoma)*, formed no part of the original version.

The "*Varietas fere sola est V. Oliva*" was an afterthought.

*V. OLIVA.* *V. spiræ basi reflexa.*

The synonyms were thus distributed. To var. *a*, Rumph. t. 39. f. 2, and Gualt. t. 23. f. B; to var. *g*, Rumph. t. 39. f. 3; to var. *e*, Arg. t. 16. f. R; to var. *d* ("*Cæsius atro-undatus*," not "*Fusco undulatus*" as printed). Rumph. t. 39. f. 4. The expressions "*ponderosa*" and "*magis sulcatum*" were not in the original.

*V. ISPIDULA.* *V. spira adscendente, margine unico.*

"Pet. Gaz. t. 59. f. 8," cited in the '*Systema*,' was also written in the manuscript: not so the "*Varietas forte præcedentis V. Olivæ.*" None of the drawings exhibit the produced spire, which must have resembled that of *O. jaspidea*. The earlier name was *ispida*.

*V. GLABELLA.* *V. ovata lævis, labii margine reflexo, basi rotundata.*

The reference to Gualtieri (a doubtful figure) was not originally inserted. The intended name was *V. polita*.

*V. CAFFRA.* *V. fusiformis lævis.*

The absurdity of asserting, in relation to this and the next species, that each resembled the other, but was larger, arose from the circumstance that when our author, in revising the labours of his amanuensis, added "*sed major*," he omitted to erase it from the following species.

*V. VULPECULA.* *V. fusiformis angulata inermis, transversim striata.*

Of the ample details the first two paragraphs only were found in the manuscript. The proposed name was *V. picta*.

*V. PLICARIA.* *V. fusiformis, angulis antice subspinosus.*

The intended appellation *angulata* was changed from an erroneous impression of the identity of the species with the *Turricula plicata* of Rumphius. "*Mueronatis*" and "*albidus*" were emendations. "*Bonan. 8. f. 65*" was referred to, as in the '*Systema*'.

*V. PERTUSA.* *V. fusiformis, labro denticulato, striata punctis pertusis.*

*V. denticulata* was the name originally proposed for this *Mitre*.

*V. MITRA.* *V. fusiformis lævis, labro denticulato.*

The final paragraph was not in the manuscript, where "*Bonan. 3. t. 119. 120*," and "*Klein, 36. Mitra episcopi*," the former cited in the '*Systema*,' the latter a mere name, were quoted as illustrative.

*V. MUSICA.* *V. spinis obtusiusculis, columella plicis 8.*

The reference to the letters X. and Y. of Gualtieri (neither of which are illustrative) stood not thus in the original: the characteristic Z. of that work was the figure really cited. The printed edition has been enlarged by an "*ob*" before "*ovato*" the addition of "*solida*," and the description of the lips.

*V. VESPERTILIO.* *V. spinis acutis, columella plicis 4.*



The only printed additions are "ob" before "ovato", "s. glauca", and "fuscis lineis" in place of the "saturatus."

V. *ÆTHIOPICA*. *V. spinis fornicatis cingentibus apicem papillarem.*

"Habitat in mari Pacifico", "Pet. Amb. t. 7. f. 5" (copied from Rumphius, t. 31. f. B.), and "Bonan. t. 3 f. 1" (cited in the 'Systema') were the unprinted additions.

V. *CYMBIUM*. The entire account of this shell was in the handwriting of Linnaeus, and inserted at a later period than the mass of species. The decided reference to Gualtieri was not in the manuscript.

V. *OLLA* was not mentioned in the written catalogue.

In addition to the species published in the 'Museum,' the following were also characterized in the manuscript:—

V. *FABA*. *V. ovata, antice subplicata, labii exterioris margine reflexo, basi rotundata.*

Bonan. 3. f. 49.

Testa magnitudine vix fabæ, ovalis, lævis, antice subplicata, livida, punctis fuscis aspersa. Spira testæ  $\frac{1}{2}$  brevior, subplicata. Labium exterius reflexum, basi rotundatum integrum.

This was evidently the shell so designated in the 'Systema.'

V. *GRANULATA*. *V. fusiformis, sulcis longitudinalibus, striisque transversalibus.*

Rumph. Mus. t. 29. f. V.

Arg. Conch. t. 12. f. V.

Testa facie antecedentis, sed sulci et striæ contrariæ, fusiformis, sulcis longitudinalibus elevatis obtusis, striis transversalibus exaratis. Color cinereus, fasciis linearibus 2 rubris ex punctis. Spira longitudine ventris. Apertura præcedentis.

This was the *V. sanguisuga* of the 'Systema.'

The preceding species referred to was

V. *LIMA*. *V. fusiformis, sulcis transversis, striisque longitudinalibus.*

Rumph. Mus. t. 28. f. T.

Testa fusiformis, scabriuscula, striis longitudinalibus secundum testam, et sulcis secundum anfractus adscendentibus margine acutiusculis. Color albidus sulcis elevatis rubris—albidus sulcis elevatis flavis albo interruptis. Spira longitudine ventris. Apertura oblonga, intus alba. Basis acuta, emarginata. Labium exterius integrum; interius nullum. Columella dentibus 4 obliquis.

These features fairly enough suit the *Mitra filosa*, generally, and with reason, supposed to be the *V. filaris* of the 'Mantissa.' The cited figure however, seems *M. gracilis* of Reeve.

## BUCCINUM.

The species which compose this group in the 'Museum' were originally separated under many generic designations.

1. *BUCCINUM*. Testa ovata, ventricosa. Apertura integra, semilunaris, superne extrorsum, postice introrsum.

2. *CASSIDA*. Testa ovata, gibba. Cauda reflexa oblique. Apertura longitudinalis, obliqua.

3. *LYRA*. Testa ovata, ventricosa. Apertura ovata, patens, pone submarginata. Labium interius nullum. Columella compressa, nitida.

4. *TURRICULA*. (No definition: evidently intended for all the turreted shells.)

5. *MORION*. Testa oblonga, inermis. Apertura oblonga, labio interiore reflexo unidentato.

In the first were located the *Dolia*, and *B. echinophorum*; in the second the *Cassides*, with *B. papillosum* and *arcularia*; in the third the *Harpa* and *Purpura*; in the fourth the *Terebræ*; in the fifth *B. glans*, *spiratum*, *glabratum*.

*B. undosum* was located in *Murex*.

*B. PERDIX*. *B. umbilicatum* subsulcatum, basi recta.

The proposed name was *B. pennatum*, adopted from Rumphius: "lunari-patula" was not in the manuscript.

*B. POMUM*. *B. exumbilicatum*, labio utroque dentato.

"Barr. Ic. t. 1325. f. 12" (cited in the 'Systema'), and "Klein, 95. Semicassis, striata, costosa", were the additional synonyms of the manuscript: "s. sulcata", "nullum, interne", "at vero in adultioribus accrescit planum album", were subsequent emendations.

*B. DOLIUM*. *B. emarginatum* subsulcatum rugosum, labio exteriori reflexo dentato.

The *Dolium fimbriatum*, or, as Deshayes prefers it, *D. Minjac* (the Malay name was *Bia Minjac* in Rumphius, who preceded Adanson), was assuredly the shell described in the 'Museum', as the recorded dentation of the outer lip clearly manifests. An excellent figure of it in Petiver ("Gaz. t. 99. f. 11") was cited in the original copy, where the drawing of Gualtieri was not referred to.

*B. ECHINOPHORUM*. *B.* (changed to *Cassida*) *tuberibus* ("quaterna serie" interpolated) *nodosum*.

The reference to Rumphius was correctly written *l*, not *I*, in the original, where "albido-flavescens" was the indicated colouring. The printed emendations were "quadruplici s. quintuplici", instead of "triplici", and the entire account of the aperture, which at first ran simply as follows, "Labium exterius crassius, margine tenuiore, interne subrugosum, obsolete dentatum."

*B. TUBEROSUM*. *B. tuberibus* gemina serie *nodosum*.

The entire published account of this species had been interpolated by Linnæus in the written copy, with the exception of the "color pallidus." The "nodis anterioribus" was a misprint for "nodis acutioribus."

Gualtieri's admirable figure of the *Cassis tuberosa* of authors was not, however, cited, which confirms my statement that the species of the 'Museum' was not the *Cassis* usually so designated.

B. CORNUTUM. *Cas. acuminibus antice cingentibus, superficie reticulata.*

The I in the reference to Rumphius was a misprint for the written l : "maculata" was originally "maculis griseis."

B. RUFUM. *Cas. nodis sparsis.*

"Pyri" was a misprint for the written "pugni". Neither the "maculis fuscis" nor the "Variat tota albo colore" were originally present. The Rumphian name *rubra* was the one written.

B. FLAMMEUM. *Cas. longitudinaliter striata, antice subnodosa.*

To the solitary synonym our author had added "List. t. 1004. f. 69" and "Sloan. Hist. 2. p. 242. n. 2". The final remark was not in the copy.

B. TESTICULUS. *Cas. lævis, striis longitudinalibus, sulcis transversalibus.*

"Vix ullus" was at first "nullus": "læve" was not present.

B. DECUSSATUM. *Cas. lævis, striis decussatis, labio exteriore dentato.* "Bonan. Clas. 3. t. 157" was an additional synonym.

B. AREOLA. *Cas. glabra, spira papillosa.*

The erroneous references to Gualtieri, and to the figure 2 of Rumphius, were not present in the original, nor was there any allusion made to the sculpture of the inner lip.

B. ERINACEUS. *Cas. subsulcata, antice nodosa, labio edentulo, postice extrorsum denticulato.*

The entire account of this *Cassis* was interpolated by Linnæus in the pages of his amanuensis.

B. GLAUCUM. *Cas. glabra, antice muricata, labio dentato, postice extrorsum denticulato.*

The superfluous A in the reference to Gualtieri was a misprint: "inferne" was "interne": the "acuminata" and "marginatum" were emendations.

B. VIBEX. *Cas. glabra, labio edentulo, postice extrorsum denticulato.* The figures 8 and 9 of Rumphius were not cited.

B. PAPILLOSUM. *Cas. papillis decussatis, labio tenui, extus denticulato, fauce glabra.*

"Rectum" followed "exterius" in the written copy, wherein "s. albidus" and "antice sinu excavata" were not to be found.

B. GLANS. *Morion labio exteriore denticulato, interiore bidentato.*

"Labium exterius margine postico denticulato" was omitted in printing.

B. ARCULARIA. *Cas. longitudinaliter sulcata, labio exteriore tenui, interiore maximo.*

B. COSTATUM. *Lyra costis longitudinalibus, antice prominulis, alternis obsoletis.*

This diagnosis but ill suits the *Many-ridged Harp*, which, of late, has been considered identical.

B. HARPA. *Lyra costis longitudinalibus antice mucronatis.*

The shell is described in the MS. as "striata subtilissime longitudinaliter", and "Pet. Amb. t. 2. f. 2", "Pet. Gaz. t. 48. f. 13" (the latter quoted also in the 'Systema') are there substituted for the reference to Gualtieri.

The printed additions are considerable; to wit, "costæ vero striis transversis", "anfractibus costis mucronatis", "denticulatum."

B. PERSICUM. *Lyra læviuscula*, labii margine crenulato.

The erroneous citation of Grew (t. 9. f. 5, 6) in the 'Systema' had been adopted in the manuscript.

B. PATULUM. *Lyra muricata* spinis obtusis.

Neither the erroneous reference to Gualtieri, plate 51. f. A (which was designed for *Purpura hæmastoma*), nor the "color interne rufescens", is to be found in the manuscript.

B. SMARAGDULUS. *Lyra glaberrima*, columella denticulata.

Neither the erroneous reference to d'Argenville, nor the specific name derived from his figure, is to be found in the MS. The proposed appellation was *L. vitrea*. "Simillima Cassid. lapillo, sed glabra, et columella crenata" is the unprinted remark.

B. SPIRATUM. *Morion umbilicatus*, anfractibus distinctis canaliculo.

The specified colouring was "alba, maculis longitudinalibus fuscis"; "pone bifidum" followed "integrum." The intended name was *M. canaliculatus*.

B. GLABRATUM. *Morion umbilico descendente flexuoso*.

d'Arg. Conch. t. 12. f. G.

"Testa oblonga, acuminata, obtusiuscula, glaberrima, anfractibus confluentibus, Neritarum maximarum pondere. Color albo-flavescens, nitidus. Apertura obliqua, profunde emarginata. Labium externis integerrimum. Labium interius antice reflexum adnatum, dein solum brevius flexuosum, descendens ad basin. Sulcus profundus distinguit basin testæ. Umbilicus pone labium interius descendens ad basin sulco."

B. VIRGINEUM. I can find no account of this shell in the written copy.

B. UNDOSUM. The nearest approach to this species seems the variety B. of the *Murex succinctus* (the shell so named in the 'Mantissa').

*M. lævis*, sulcis transversis lævibus, angulo marginali.

d'Arg. Conch. t. 12. f. N. Bon. 3. f. 47.

Testa ovata, absque tuberculis, magnitudine nucis, exarata sulcis transversis pallidis, eminentibus vero lineis luteis. Spira obtusa, anfractibus rotundatis. Cauda teretiuscula. Apertura ovata, margine crasso, nec alia costa laterali crassa.

Var. B. Rugis s. angulis oblitteratis 5 longitudinalibus.

B. MACULATUM. *Turricula elongata*, anfractibus lævibus integerrimis.

The I. of Gualtieri, and the reference to d'Argenville, were printed emendations.

B. CRENULATUM. *Turric. elongata*, anfractibus margine crenatis.

The reference to Gualtieri was an emendation.

B. STRIGILATUM. *Turric. elongata*, oblique striata.

B. DUPLICATUM. *Turric. elongata* emarginata, anfractibus bipartitis striatis.

## STROMBUS.

This genus, rendered more natural by the omission of *S. lividus* and *ater* (assigned to *Turricula*), appeared under the designation of HARPAGO with the following definition:—

Testa depressa, nodosa. Apertura longitudinalis. Labium antice dilatatum ultra basin.

The *Strombi* of the manuscript were the young of this genus (erased by Linnæus) and certain Lamarckian *Fusi*, *Pyrulæ*, and *Fasciolarie*.

S. CHIRAGRA. *Har.* labii spinis lævibus 6, extimis recurvis, fauce striata.

“Bar. Icon. 327. f. I.” was an additional synonym.

S. SCORPIUS. *Har.* labii spinis nodosis 7, fauce striata.

The published account was enlarged by the following passages, which are not to be found in the written copy: “crenulato cincta”, “lato, brevi”, “s. incarnata”, “s. testaceo-nebulosus”. “Distinctum” was originally “obscuro”, and “repandus, inflexus” was “denticulatus.”

S. LAMBIS. *Har.* labii spinis lævibus 7, fauce lævi.

“Bar. Icon. t. 1326. f. 7” was the synonym omitted in printing. The name was borrowed from d’Argenville.

S. MILLEPEDA. *Har.* labii spinis lævibus 10.

“Anteriora” was “posteriora” in the manuscript.

S. LENTIGINOSUS. *Har.* labio inermi integro rotundato, angulis pluribus nodosis.

The “aut marginatum” was “fragile, diaphanum”, so that a young shell appears to have furnished the materials for description.

S. GALLUS. *Har.* labio inermi mucronato, cingulo dorsali spinoso.

S. AURIS-DIANÆ. *Har.* labio inermi muricato, cauda recurva, lobo incurvato.

The “32. f. H.” was a misprint for the written “17. f. O.” The printed additions are “usque” and “Color testaceo et albido nebulosus.”

S. PUGILIS. *Har.* labio inermi obtuso, spira spinosa distincta, basi emarginata.

“Nitida”, and “sed spira albida”, were not found in the original.

S. LUHUANUS. *Har.* labio obtuso, antice posticeque emarginata.

Few of the details were present in the original copy, but appear to have been added, to discriminate the species from the allied *gibberulus*. “Spira obtusa brevis” was added by the hand of Linnæus; “sæpe subplicati”, “postice lobo obsoleto instructum”, “intus”, “Columella nigricans”, “Cauda nulla, sed postice emarginata”, were all absent from the MS.

S. GIBBERULUS. *Har.* labio inermi, dorso lævi, spira repanda.

The printed additions are “subtus planiuscula”, “læves”, “fuscum”, and the final remark.

S. LATISSIMUS. *Har.* labio inermi rotundato, spira subnodosa brevior, dorso lævi.

*S. EPIDROMIS.* *Har.* labio inermi dilatato, dorso lævi, spira subnodosa.

The *S. epidromis*, as it originally stood in the manuscript, was a recognizable species, and precisely identical with the shell so named in the 'Systema'; for the erroneous reference to Gualtieri was not present, neither was "carinato," nor any of the discordant details from "interius" to the termination. As the printed description now stands, it would suit *S. emarginatus* or *succinctus*, at the least, equally well. I doubt not our author, when correcting the press, forgot his own species, and added the partial essentials of one species to those of another.

*S. CANARIUM.* *Har.* labio inermi dilatato, dorso spiraque lævibus.

The erroneous reference to plate 37 of Rumphius was not present in the written copy, which contains the additional synonyms of "Pet. Gaz. t. 98. f. 11", and "Klein, t. 4. f. 73": the latter was not there originally. The early description has been improved, in the press, by the addition of "obovata", "Faux lævis, alba", and "longitudinaliter subundulatus."

*S. VITTATUS.* *Har.* labiis inermibus, spiræ anfractibus vitta interstinctis.

*S. URCEUS.* *Har.* labiis inermibus striatis, dorso nodoso.

The erroneous reference to Gualtieri was not present in the original, but in place of it the 37. W. of Rumphius (*S. mutabilis*): "Spira testa brevior, plicato-subnodosa" was, likewise, absent. "Klein, 49, urceus fimbriatus" (a name for Rumph. t. 37. f. F & W) was interpolated by our author.

*S. ATER.* *Turricula* labiata.

Neither the reference to Rumphius, nor the "et postice emarginatum" were found in the original. This confirms my expressed belief that the Museum species (to which no name was at first attached) was distinct from that of the 'Systema.'

*S. LIVIDUS.* *Turric.* labiata, anfractibus serie subspinosa.

This was located in a section of *Turricula* distinguished as having the outer lip dilated and rounded.

Besides the above, the following unprinted details were found in the manuscript:—

The *Strombus gigas* was described at length under the appellation of *Harpago gigas*.

*Har.* labio inermi rotundato, dorso spiraque subulato-spinosis.

Gualt. t. 34. f. A. Bar. Icon. 1727. f. 7.

Testa gibba, maxima, magnitudine capitis. Cauda obtusa. Spira spinis patentibus, subulatis, validis. Anfractus desinens in dorso spina. Series in dorso spinarum maximarum ferme conicarum. Labium dilatatum, rotundatum, spira longius, vix adnatum spiræ. Faux glabra, nitida, incarnata. Color pallidus.

The *Strombus dentatus*? was also defined (without a specific appellation) by the following characters:—

*Har.* labio dentato, testa lævis, plicato-nodosa.

Testa simillima reliquis, longitudine articuli digiti, lævis, flavescens, sub-

plicata, plicis antice acuminatis nodis. Spira acutiuscula, similiter plicata, nodosa. Labium exterius minus dilatatum, postice margine dentatum et interne fuscum, striatum. Labium internum crassum, integrum, læve.

The *Strombus palustris*, although not published until the twelfth edition of the 'Systema,' had been already defined in the 'Museum' as *Turricula cornea*.

*Tur.* decussatim rugosa, labio dilatato.

Rumph. 101. t. 30. f. Q. *Strombus palustris*.

Testa crassa, rudis, pyramidalis, cornea aut plumbea, anfractibus 12 et ultra, secundum spiras transversim aliquot striis exarata, longitudinaliter subplicata, adeoque sine spinis rugosissima. Labium dilatatum, rotundatum, concavum, edentulum.

### MUREX.

The definition of this genus ran as follows :—

Testa subovata, spinosa. Apertura coarctata, ovata, desinens in canalem tubuloso-conniventem.

This was evidently designed for the *Murices* proper. The other species of the 'Museum' were distributed in the groups of *Cassis*, *Turricula*, *Bulla*, and *Strombus*. The last was defined as follows ; "Testa obverse conica, nodosa, labium exterius angulum transversalem superne formans; interius nullum. Columella incurva. Cauda integra."

*M. HAUSTELLUM.* *M. caudatus*, subinermis, nodosus.

"Suturis" was originally "costis". The printed emendations are "gibbis, adglutinatis", "costati et nodosi", "subtus rima longitudinali clausa", "margine", and the final remark.

*M. TRIBULUS.* *M. caudatus*, spinis subulatis trifariis.

"Olear. Mus. t. 39. f. 1" was cited in the transcript, to which Linnæus had added "Bonan. 269" and "List. t. 902. f. 22", all which synonyms are present in the 'Systema.' The printed additions are "suturis 3 longitudinalibus, adglutinatis, incrassatis", "secundum suturas: superficies transversim striis elevatis distinctis", "recta".

*M. CORNUTUS.* *M. caudatus*, spinis subulatis serie gemina.

The s. in the reference to Rumphius was a misprint for the written 5 : "Pet. Gaz. t. 68. f. 12" (as in the 'Systema') was present in the copy. The expressions "striata", "conicæ", "obliquo situ", and the final remark, are the printed additions.

*M. TRUNCULUS.* *M. subcaudatus*, spinis simplici serie.

The description of the tail and account of the variety were not originally present : "suturis" was, at first, "plicis", and "adglutinatis" was "antrorsum adnatis".

*M. RAMOSUS.* *M. dædaleus triangularis*, spira longitudine ventris.

Had the original manuscript been printed, the multitude of species confused under this appellation would have been somewhat lessened. For the cited figures of *M. inflatus* (Rumph. t. 26. f. A. and Gualt. t. 38. f. A), with that of another short-spined *Murex* (Arg. t. 19. f. C), were separated from

the rest, and quoted for a *M. unguis-odor*, the brief definition of which was "*M. dædaleus triangularis, spira ventre brevior.*"

The published details, and the drawings of the longer-spined and more slender-bodied *Murices* (Rumph. t. 26. f. 1; d'Arg. t. 19. f. E, H.), appeared as *M. lichenoides*.

I consider, then, that in that event the *M. adustus* (Arg. t. 19. f. H.), which would tolerably suit the definition, would have been considered the typical form, and *M. axicornis* (Rumph. t. 26. f. 1, and d'Arg. t. 19. f. E.), the variety  $\gamma$ .

**M. SCORPIO.** *M. dædaleus quadrangularis, spira subcapitata.*

The ill-judged final remark was not in the copy.

**M. SAXATILIS.** *M. dædaleus quinquangularis, spira contigua.*

The idea of this being a mere variety was not expressed in the original.

**M. RANA.** *M. angulatus subdepressus, costis lateralibus.*

The R. of d'Argenville was properly referred to the variety B. The "alba", "sulcis transversis", and "Dorsum anfractum simplici cingulo aculeato" were not in the copy.

**M. LAMPAS.** *M. angulatus tuberculis nodosis, cauda flexuosa, labio interiore lævi.*

The earlier reading of "una alterave ruga" was "uno alterove denticulo."

**M. FEMORALE.** *M. angulato-triqueter: angulis antorsum acuminatis.*

The intended name was *M. triqueter*. Grew's engravings (f. 7, 8) of the species were correctly cited, and the erroneous reference to Rumphius was not inserted. The printed additions were unimportant—"exarata", "repando", "sub" before "edentula", and "levissime".

**M. LOTORIUM.** *M. angulatus, tuberculis conicis, cauda flexuosa, labio interno rugoso.*

"Subter" was a misprint for the written "inter": the "ut in proximis" was a printed addition.

**M. RUBECULA.** *M. angulatus, sulcis moniliformibus, costis lateralibus, dorsalique.*

"Gualt. t. 49. f. I" was rightly cited as illustrative: "ex" preceded "lineis".

**M. RETICULARIS.** *Cas. inæqualis gibba reticulata, cauda elongata.*

The erroneous reference to Rumphius was not present in the manuscript. As corroborative of my expressed belief in the identity of the species described in the 'Museum' with the *Triton mulus*, it may be observed, that our author has wholly separated this and the allied *anus* from the true *Tritons* and *Ranellæ*, and that the original heading corresponds accurately with the peculiar characteristics.

**M. ANUS.** *Cas. inæqualis, gibba nodosa, labris rugosis.*

"Pet. Gaz. t. 74. f. 9" and "Pct. Amb. t. 6. f. 4" were the unprinted synonyms. The "rugis reticulato-intertextis", "irregularis", and "pateus" were emendations.

**M. RICINUS.** *M. ecaudatus, ore utrinque dentato.*

"Æqualibus, ad labium majoribus" was not in the copy.



**M. CAPITELLUM.** *M. ecaudatus ovatus, columella rugosa, labio edentulo, superficie inermi rugosa.*

"Alba" followed "edentula", and "Umbilicus ad basin" terminated the description in the original: the word "striis" was a subsequent introduction.

**M. TURBINELLUS.** *M. ecaudatus, turbinatus, columella dentata, spinis explicatis.*

The printed additions are "anteriores", "nodulosa", "alba", "Cauda vix ulla", and "Variat colore albo spira longiore".

**M. CERAMICUS.** *M. ecaudatus, utrinque acuminatus, columella dentata, spinis conicis.*

"Rumph. t. 49. f. L." was an unpublished synonym.

**M. NODUS.** *M. ecaudatus ovatus, labio denticulato.*

As "Gualt. t. 28. f. R." was quoted, and "aut nigris, conicis, obtusius-enlis" (a character which probably belonged to some distinct species erroneously supposed to be a variety) was not inserted in the manuscript, I feel convinced that the *Purpura hystrix* of authors was the species designed in the 'Museum Ulricæ.'

**M. HYSTRIX.** *M. ecaudatus edentulus, fauce lævi.*

**M. MANCINELLA.** *M. ecaudatus, edentulus fauce striata.*

This original heading, and the absence of the erroneous synonym from the MS., confirm the received opinion of the identity of the Museum species (not that of the 'Systema') with *Purpura mancinella*.

**M. HIPPOCASTANUM.** *M. ecaudatus edentulus, fauce edentula integra, spinis serie triplici.*

Gualtieri's erroneously cited figure was not indicated in the manuscript. No specific name had been originally attached to the description.

**M. MELONGENA.** *M. ecaudatus edentulus fauce patula lævi, spinis serie duplici.*

"Bonan. 3. f. 186" had been added to the synonymy by our author. The details were less copious than in the published edition, "apice solo acuminatus" being the meagre substitute for the entire description from "Spira" to the end.

**M. FICUS.** *Bul. caudata, striis reticulatis, spira obtusa.*

"Pet. Amb. t. 6. f. 9" was an omitted synonym. The shell described in the 'Museum' was assuredly not the *ficus* of most writers.

**M. RAPA.** *Bul. caudata, striis longitudinalibus, spira acuta.*

**M. FUSUS.** *Turric. caudata lævis, labio dentato.*

"Bonan. f. 121" and the name had been added to the MS. by Linnæus.

**M. BABYLONIUS.** *Turric. caudata, transversim angulo sulcata, labio marginali versus basin sinu exciso.*

**M. COLUS.** *Turric. caudata striata, labio exteriori ere-nato.*

The printed emendations were "longa" and "s. angulati." The name was added by Linnæus. The following unnamed *Turricula* succeeded the species in the manuscript copy:—

*T. caudata striata, longitudinaliter sulcata.*

Testa parva, striis plurimis secundum anfractus. Anfractus scabri, sulcis longitudinalibus 15. Color anfractuum superne griseus inferne pallidus. Apertura ovata. Rostrum baseos rectum, testæ dimidio brevius. Labium tantum exterius integrum. An filia præcedentis?

M. MORIO. *Strom.* spira subnodosa, labio exteriori intus rugoso.

The synonymy, as might be expected (for Seba was unknown to Linnæus when the descriptions were written), was not in the original.

M. COCHLIDIMUM. *Strom.* spira pyramidata, anfractibus planis.

The reference to Seba, the name, and the "Cauda subulata, longitudine testæ" were not present.

M. CANALICULATUS. *Strom.* spira subconvexa, anfractibus distantibus.

The "Anfractus distincti canaliculo per omnes spiras," the name, and the reference to Seba, were the printed additions. "Habitat in Canada. Kalm." was appended.

M. ARUANUS. *Strom.* incurvus spinosus ventricosus, angulo obsoleto.

The objectionable name (for assuredly the *Buccinum Aruanum* of Rumphius suits not "spinosus") was not present in the original, but had subsequently been added by our author, who seems to have erased the original "Habitat in Canada. Kalm." I doubt not that *Pyrula carica* was intended.

M. PERVERSUS. *Strom.* inversus.

The wretched engraving of Gualtieri was not cited.

M. TRITONIS. *Cas.* pyramidalis lævis, columella dentata.

"Bonan. 3. f. 188" stood in the place of Seba. The printed additions were "plerisque", "et suturis variis alternis crassis", and the specific epithet. "Genus difficile eruitur" was written after the description, and the following note erased:—"Ad genus retuli ob labium interius adnatum in quibusdam latius, ob suturas verrucosas, ob eandem canaliculatam parum elevatam, ob labium postice dentatum, quæ omnia affinitatem arguunt."

The *Triton nodiferus* was probably designed by the following description, which succeeded that of *M. Tritonis*:—

*Cas.* (corrected by Linnæus to *Murex*) *Neptuni*. *C.* pyramidalis nodosa, columella dentata.

Testa maxime facie statura et colore præcedentis. Anfractuum angulus summus nodis prominentibus, unde et spira nodosa evadit, quod non in præcedente. Apertura præcedentis. Labium interius magis dilatatum, maximeque planum. Columella non dentata. Habitat Constantinopoli. Edw. Carleson.

M. TRAPEZIUM. *Strom.* spira nodosa, labio denticulato, columella rugosa.

M. ALUCO. *Turric.* recurvirostra, spinosa, serie simpliciei.

Gualtieri was not cited, and the reference was to "N. Strombus tuberosus" (*Cerithium aluco*), not O. (*C. nodulosum*) of Rumphius. The inner lip was described as "non adnatum, sed prominens": "s. fuscis", and "Variat cauda recta, &c.", were not in the original.

Besides the published species, the following had been written, but omitted in printing :—

**TURRICULA ALBA.** *T. alba recurvirostra*, anfractibus margine crenulatis.

Bon. 3. t. 84. Rumph. t. 30. f. K. Pet. Gaz. t. 56. f. 4. d'Arg. Conch. t. 14. f. P. Gualt. Test. t. 57. f. D.

Testa lævis. Anfractus circiter 15, margine subcrenati. Color albus, sæpius saturator ad marginem anfractuum. Apertura ovata, rostro canaliculato, recurvo. Labium interius adnatum, dente unico obsoleto.

This was evidently identical, from its synonymy, with the *M. vertagus* of the 'Systema.'

**TURRICULA SENTICOSA.** *T. reflexo-emarginata*, costis reticulatis.

d'Arg. Conch. t. 12. f. O.

Testa gibba, costis sæpius 12 perpendiculari-obliquis, intertextis striis lamellosis transversis ad anastomosases muricatis, unde admodum scabra evadit. Anfractus ventricosi, sæpius x. Color griseus. Apertura ovata, interne striata, emarginata, parum reflexa.

Evidently this was identical with the *M. senticosus* of the 'Systema.'

**M. OLEAGINEUS.** *M. angulis sulcis inæqualibus*, labio interiore rugoso, costis alternis.

Gualt. Test. t. 49. f. G. d'Arg. Conch. t. 13. f. M.

Habitus et structura *rubeculæ*, at octies major, nec vivide pictus, sed colore testaceo fasciis fuscis longitudinalibus. Apertura intus saturate crocea, rugis albis.

Apparently this was the *Triton pileare* of authors,—not the Mediterranean shell (*T. corrugatus*) termed *M. pileare* in the 'Systema.'

**M. PILEUS HELVETICUS.** *M. angulis rotundatis*, tuberculis conicis, apertura utrinque canaliculata.

d'Arg. Conch. t. 12. f. D. Rumph. t. 28. f. D.

Testa ovata, admodum inæqualis, adspersa nodis conicis tuberculatis inæqualibus. Costæ latere antico membranaceæ, primæ 2 oppositæ, reliquæ alternæ. Color flavus. Apertura hians, antice et postice canaliculatæ, faux intus striata. Labium exterius dentatum, intus dilatato-membranaceum.

This suits very fairly the *Triton lampas* of authors; far better, indeed, than does the *M. Lampas* of the 'Museum Ulricæ.'

**M. SUBULATUS.** *M. ecaudatus*, pyramidalis.

Testa subulata instar turris, anfractuum undecim, reticulata striis elevatis decussantibus punctis contignationem eminentibus. Costæ oppositæ et alternæ. Color albus, maculis flavescentibus. Apertura ovata. Labium exterius crassum, intus dentatum. Interius dentato-glabrum.

Both *Triton! maculosus* and *Ranella candisata* approach the ideal portrait, yet neither of them precisely agrees.

Under the name of *Trochus turritus* our author appears to have first described his *Murex radula*.

*Trochus exumbilicatus*, pyramidatus, anfractibus duplici serie muricatis.

Gualt. t. 58. f. F.

Testa elongata, flavesceus s. testacea. Anfractus 16, connexi suturâ crenulatâ, dorso duplici serie instructi punctis eminentibus pallidis. Aper-tura subtetragona, subtus in canalis rudimentum desinens.

The *Murex Neritoideus* of the 'Systema' was thus described.

LYRA NERITOIDES. L. testa nodosa subrotunda.

Gualt.

Testa crassa, ponderosa, alba eum rubedine tincta, figura Neritæ, magnitudine juglandis, cincta anfractibus 5 e nodis obtusis crassiusculis. Labium interius depressum, longitudine pictum macula ferruginea.

## TROCHUS.

Testa conica. Apertura quadrangularis, basi columella contorta, sinu descendens.

The last five words had been substituted for "absque sinu evidente."

T. MACULATUS. T. contorto-umbilicatus conicus, vertice subnodoso.

The printed description and the synonymy are so very dissimilar to the written one, that I entertain no doubt that an early definition of *T. Niloticus* (with references to "Olear. Mus. t. 9. f. 5" and "Bonan. 3. f. 102") was transmuted into that of a granular species, by the addition of "quasi granis exasperata," &c.

T. SOLARIS was not mentioned in the manuscript.

T. PERSPECTIVUS. T. crenato-umbilicatus convexus obtusus: margine acuto.

"Bonan. 3. f. 27, 28" was quoted, as illustrative: "costa crenata", not "costa concava", was the earlier reading.

T. HYBRIDUS. T. crenato-umbilicatus, convexus, undique obtusus.

The proposed name was *T. spurius*. The "absque carina, rotundata" was "absque angulis, glabra": "albo, flavoque" preceded "variegata".

T. PHARAONIUS. T. umbilicatus subovatus striatus, punctis globulosis, labio dentato.

"Habitat in mari rubro, frequens. D. Hasselquist." was written: the final remark was absent.

T. MAGUS. T. umbilicatus convexo-conicus nodosus.

The "cinereo nebulosa" was a manuscript emendation by Linnæus.

T. MURICATUS. Except that "obverse" precedes "ovata", both the diagnosis and the details are precisely similar to the printed account.

T. SCABER. T. umbilicatus subovatus, sulcis alternis majoribus moniliformibus.

The erroneous figure of d'Argenville was not cited in the original, nor, indeed, was any name attached to the description. The whorls were said to number from 6 to 8 (not 4 or 5); and the aperture was termed "ovata," not "subrotunda." "Pallida", the final remark, and the present construction and enlargement of the passage relative to the inner lip (which at first ran thus, "Labium posticum coadunatum, sinu postico excisum"), had been added by Linnæus himself.

**T. LABIO.** *T. exumbilicatus ovatus striato-tuberculatus*, labio dentato.

The erroneous figure of d'Argenville was not cited; "variegata" was the earlier reading of "marmorata"; "aliquot" of "et punctis"; "externo" of "margine". Linnæus himself had enlarged the account of the inner lip from the earlier "postice sinu excisum" to its present length.

**T. ZIZYPHINUS.** *T. umbilicatus conicus, striis papillois.*

This is clearly not the imperforated *zizyphinus* of the 'Systema.' Gualtieri was not referred to; "ambitu marginati", and "in aliis clausus", were not in the copy: "columella parum obliqua" was an addition in the Linnean handwriting.

**T. TELESCOPIUM.** *T. exumbilicatus pyramidatus, striis exaratus; labio postice recurvato, spirali, integro.*

"Bon. 92", and "Klein 26. *Pseudotrochus striatus*", were the additional synonyms of the MS.

**T. DOLABRATUS.** *T. umbilicatus, labio postice recurvato sulcato, ovato-pyramidalis, glaber.*

The whorls were at first called imbricated. The "basis rotundata", and "in superioribus vero unica", had been added by Linnæus.

## TURBO.

Testa conica. Apertura orbicularis, integra.

**T. PERSONATUS.** *T. exumbilicatus inermis convexus, labio postice diducto.*

The I of the reference to Rumphius was a misprint for the written l. A drawing of Gualtieri (t. 64. f. O), which accords not with the description of this species, was an additional synonym. The name had been added subsequently. *Turbo cidaris* agrees in most respects.

**T. PETHOLATUS.** *T. exumbilicatus ovatus lævis, anfractibus sursum obsolete angulatis.*

The written version furnishes us with the additional synonyms of "Gualt. t. 64. f. F.", and "Klein 40. t. 2. f. 51."; the latter (also cited in the 'Systema') was added by our author when he admitted the at first excluded 5. 6 of the synonym of Rumphius. The admission of the rounded-whorled variety? was evidently an after-thought.

**T. CHRYSOSTOMUS.** *T. exumbilicatus subovatus rugosus striatus, spinis fornicatis.*

"Klein 41. t. 7. f. 126" (cited in the 'Systema'), and the printed "in superiore serie majoribus". had been added by Linnæus in the original account.

**T. TECTUM-PERSICUM.** *T. exumbilicatus subovatus, spinis obtusis reflexis, subtus papillosus.*

"Forte sola varietas sequentis a loco" has been remarked by our author, who did not admit in his MS. the deceptive figure of d'Argenville.

**T. PAGODUS.** *T. exumbilicatus conicus spinis obtusis concatenatis, subtus papillose striatus.*

Neither "acuminata", nor the inappropriate "rotundata", were in the original account of this well-known species.

**T. CALCAR.** *T. exumbilicatus depressus, anfractibus supra spinis fornicato-compressis scabris.*

To his printed synonyms Linnæus has added "Gualt. t. 65. f. N. P.", "List. Hist. t. 608. f. 46", and "Klein t. 1. f. 27". The "fornicatis" was an emendation.

**T. MARMORATUS.** *T. exumbilicatus subovatus nodosus lævis.*

**T. PICA.** *T. umbilicatus lævis conicus denticulo umbilicali.*

"Habitat in Barbados, Jamaica", which corrects the stated locality of the 'Systema,' and "Bonan. 29, 30", "Pet. Gaz. t. 70. f. 9", were the additional particulars of the manuscript copy.

**T. ARGYROSTOMUS.** *T. umbilicatus subovatus, striatus lineis dorsalibus.*

The erroneous references to Gualtieri and d'Argenville, were not present: "os argenteum variegatum" was written after the reference to Rumphius, which name belongs to figure 3, not to 4, whose colouring, moreover, excludes it from being illustrative. The intended specific name was "os variegatum."

**T. MARGARITACEUS.** *T. exumbilicatus subovatus, (? angulo) dorsali elevato, ore postice diducto.*

Rumphius was not referred to in the original, where "subtilissimis" was in the place of "variis": the printed "margine albo" was a subsequent emendation.

**T. DELPHINUS.** *T. umbilicatus depressus hispidus, spinis ramosis.*

"Pet. Amb. t. 3. f. 1", and "Grew Mus. t. 11. f. 5, 6", were also cited.

**T. DISTORTUS.** *T. umbilicatus muricatus undique spinulis brevibus.*

The final remark was not in the original.

**T. SCALARIS.** *T. cancellatus conicus, anfractibus distantibus.*

"Pretium immensum, sæpe 100 ducatorum", was the final remark instead of the printed one. "Pet. Amb. t. 2. f. 9", was an additional synonym in the written version.

**T. CLATHRUS.** *T. cancellatus pyramidatus, anfractibus contiguus lævibus.*

All the synonyms of the tenth edition of the 'Systema,' together with "Johnst. t. 11, f. 9", were present in the MS., but most of them, together with the final remark, had been subsequently added to the copy by our author.

**T. CRENATUS.** *T. cancellatus pyramidatus, anfractibus contiguus supra crenatis.*

The details of the 'Museum' were referred to before their publication. "Pyramidalis" was the earlier reading for "turrata"; "sæpe" was absent: "transversim" preceded "crenati."

**T. UVA.** *T. cancellatus ovatus, anfractibus contiguus imbricatis.*

"Pet. Gaz. t. 27. f. 2. Olivaris" was the unpublished additional synonym, and the intended name was borrowed from that work. "Longitudinalibus" was "transversis" in the copy, where "ut latus planum non conspiciatur exterius distincta linea" terminated the account of the volutions: the colouring ("alba") was not indicated.

**T. CORNEUS.** *T. umbilicatus*, anfractibus teretibus decussatim striatis, oris margine reflexo.

The "s. cornea", the name, and the "vix manifeste" had been added to the original account, which latter was referred to previous to its publication.

**T. IMBRICATUS.** *T. pyramidalis*, anfractibus deorsum subimbricatis.

The "præcedentibus tribus", here mentioned, were not those which the species now follows, but nos. 358, 359, 360, after which it was placed in the MS. "Grisea" had been added by Linnæus.

**T. REPLICATUS.** The entire account of this shell was interpolated in the MS. by Linnæus.

**T. ACUTANGULUS.** *T. pyramidalis*, sulco unico acuto majore.

The last four words of the details were written subsequently to the earlier description, to which no name was then appended.

**T. DUPLICATUS.** *T. pyramidalis*, sulcis 2 acutis.

"Bonan. 3. f. 114", and "List. 160. t. 3. f. 7", were additional synonyms; both, however, were quoted in the 'Systema.' The "color albus", and the term "obtusiores", were in the Linnean handwriting.

**T. TEREBRA.** *T. pyramidalis*, sulcis 6 acutis.

"Bonan. 3. f. 115" was in the place of the doubtful figure of Rumphius; the indicated colouring was simply "pallida": the "obsoletum" was an afterthought.

## HELIIX.

Testa cochleata, lævis. Apertura subrotunda segmento circuli exempto.

Except *scarabæus* and *amarula*, the members of this genus were located in the same group as in the published edition.

**H. SCARABÆUS.** *Morion* ovatus subanceps, labio utroque tridentato.

The "ovata, adeo" has replaced the earlier "ita", and "angulata" the original "articulata". The account of the aperture was not inserted in the manuscript, wherein "List. Hist. 577. f. 31", and "Klein 11. t. 1. f. 23", had been inserted in the Linnean handwriting.

**H. LAPICIDA.** *H. marginata* perforata convexa carinata.

"Cineta" was a press emendation. The only written synonym was "Faun. Suec. 1298".

**H. OCLUS-CAPRI.** *H. marginata* perforata subcarinata.

"Pet Gaz. t. 76. f. 6." was indicated as a synonym. The name was Latinized from the "*l'œil de bouc*" of d'Argenville, who has, however, represented an utterly different shell.

**H. CAROCOLLA.** *H. submarginata* imperforata carinata, labio interiore recto.

D'Argenville's figure was, evidently, not at first considered sufficiently illustrative to be referred to: it was not cited in the written copy. "Conicoplaniuscula" was the reading for "convexa", "segmento circuli" (the  $\frac{1}{4}$  without any sequence was absurd) for "semiovata": the size, as usual, was not given.

II. CORNU-MILITARE. *H. marginata imperforata subcarinata, labio interiore explanato.*

The deceptive figure of Gualtieri was not at first cited.

II. CORNEA. *H. marginata convexa umbilicata, spira plana.*

"Faun. Suec. 1304" was in place of the reference to 'Lister's English Conchology,' a work apparently unknown to our author when he first drew up the Museum Catalogue. I doubt the identity of this shell (the intended name for which was *tabellaris*) with the cornea of the 'Systema.'

II. CORNU-ARIETIS. *H. utrinque depressa.*

"List. Hist. t. 136. f. 40" was written by our author in the manuscript copy.

II. AMPULLACEA. *H. subrotunda, sursum ventricosior glabra.*

The original reading of "anfractus superne ventricosi" was "abdomen superne ventricosius". The erroneous reference to Gualtieri was not at first attached to the description. The species of the Museum was evidently distinct from that of the 'Systema.'

II. GLAUCA. *H. subrotunda acuminata, labro postice marginato.*

II. CITRINA. *H. umbilicata convexa obtusa.*

The final remark was an afterthought.

II. ARBUSTORUM. *H. marginata perforata convexo-acuminata, ore suborbiculari, margine duplici, antice elongato.*

"Faun. Suec. 1295" was the only synonym; the work of Lister on English Conchology not having been at first known to Linnæus.

II. UNGULINA. *H. marginata perforata spiralis convexa, ore suborbiculato.*

The "Gualt." was a misprint for the written "Rumph."

II. LUTARIA. *H. ovata-oblonga umbilicata, interne coloratiore.*

"Habitat frequens in lutosi fluvii, lacubus." May not the *Valvata piscinalis* be the shell intended?

II. PERVERSA. *H. ovato-oblonga subperforata glabra.*

"Pct. Gaz. t. 44. f. 7", and "Grew. Mus. t. 10. f. 9", cited in the 'Systema', were also referred to in the MS. "Alba", and "in quibusdam", were interpolations in the Linnean handwriting: *H. sulphurata* was the intended designation.

II. IANTHINA. *H. subrotunda obtusa patula diaphana.*

The entire account of this beautiful shell was written by Linnæus subsequently to the labours of his amanuensis: the twelve last printed words were not present. The cited figure of Gualtieri was not admitted, as a representation, but only alluded to in the final remark of "Confer Gualt. t. 64. f. O." "List. Hist. t. 572. f. 23", and "Sloan. Jam. 2. p. 239. t. 1. f. 4" were indicated as delineations.

II. NEMORALIS. *H.*

"Habitat ubique in Europæ nemoribus", and "Argen. t. 32. f. 8", were the unprinted additions. Lister's English Conchology was not, of course, mentioned. "Flavescens", and "nigro-purpurascens", were not in the original.



H. HÆMASTOMA. *H. imperforata subrotunda fusca fascia longitudinali subrecta alba, ore purpureo.*

H. DECOLLATA. *H. elongata lævis truncato-mutilata.*

"Pet. Gaz. t. 66. f. 1", and "Habitat in Arabia. Hasselquist. Santa Cruz. Petiv." were the unprinted additions. The entire account was in the handwriting of our author.

H. AMARULA. *Nerita edentula oblonga, anfractibus multifariam denticulatis.*

Our author was evidently puzzled as to the generic position of this peculiar-looking shell, for he has written "Habitum accedit ad Volutas vesperiliones, ore Helicibus, sed labium interius planum, et affinitas cum antecedenti fiat, ut hic relinquatur." The preceding shell alluded to was *N. corona*.

H. NERITOIDEA. *H. convexa longitudinaliter striata.*

The erroneous reference to Gualtieri was not present in the written copy.

H. PERSPICUA. *H. convexo-ovata, labio interiore nullo, apertura ad apicem usque pervia.*

The then unpublished details of both this and the preceding were referred to in the tenth edition of the 'Systema.' Patens was the proposed specific appellation.

H. HALIOTOIDEA. *H. depresso-planiuscula obtusissima, ore ovali dilatato.*

None of the cited figures were at first accepted by our author, who only added that of Rumphius to the earlier description, and wholly omitted the rest. "Transverse" preceded "striata".

## NERITA.

Testa subrotunda, obtusa. Labium interius planum, transversim truncatum, depressum.

The generic arrangement was similar to that of the printed version.

N. CANRENA. *N. edentula umbilicata, spira mucronata, labio reflexo bifido.*

When Linnæus first described this shell, under the appellation of *N. musica*, he did not admit a single one of the cited figures as illustrative.

N. GLAUCINA. *N. edentula convexa, umbilico simplici semiclauso gibboso dicolore.*

None of the deceptive figures were at first referred to, but had been added at a subsequent period; and that of Rumphius again erased. *N. luteola* was the intended name.

N. ALBUMEN. *N. edentula subrotunda, umbilico teretiusculo.*

The present heading agrees with the subsequent details, which could not be affirmed of the printed one borrowed from the 'Systema.' The MS., in some degree, clears up the extraordinary confusion in which the Linnean species was enveloped. There were two *N. albumens* in the written copy. The shell here described (assuredly not the lobed *albumen* of the 'Systema') was originally termed *hepatica* or *luteola* (for both had been erased). The true *albumen* was described as "edentula subrotunda, umbilico subcordato.

labri interioris lobo explanato" and the only figure referred to was "Rumph. t. 22. f. B." "Klein 13. *Platystoma vitellum compressum*" was also mentioned. This description was suppressed, and the other species retained, with the erroneous designation, and the faulty synonymy, attached. Nor was this the only change. In order to include the *Natica vitellus* of authors ("Rumph. t. 22. f. A. *Valvata lævis prima s. vitellus*" had been quoted by our author) the "aut lutea", "aut maculis albis", had been added to the earlier description: so, likewise, had been "Apertura rotundata, semicordata", and "glabrum, planiusculum, nitidum." I suspect, then, that whilst the ideal of the *albumen* of the 'Systema' was any hemispherical or flattened *Natica* with a labial lobe (such as *Nat. albumen*, *didyma*, *olla*, &c.), the *albumen* of the 'Museum', as printed, was composed of *Natica rufa* ("Rumph. 22. f. D." was quoted in the MS.) and *vitellus* (for A, not B, of Rumphius was the letter indicated in the MS.).

*N. MAMMILLA.* The entire account of this common shell was added in the Linnean handwriting. The inappropriate "aut lutea" was not at first present.

*N. CORONA.* *N. edentula*, simplici spira spinosa.

"Pet. Amb. t. 3. f. 4.", a mere copy of the Rumphian figure, was also quoted. The 19 in the reference to d'Argenville was a misprint for the written 10. *N. spinosa* was the intended designation.

*N. RADULA.* *N. edentula sulcata*, tuberculis æqualibus.

The *valvata granulata* of Rumphius (t. 22. f. M.) was referred to as illustrative.

*N. CORNEA.* *N. edentula*, obsolete striata.

*N. BIDENS.* *N.*

"Obsoletis" followed "duobus": the name had been written subsequent to the description.

*N. VIRGINEA.* *N. subedentula ovata lævis*.

"Dentibus pluribus minutissimis" preceded "oris"; "Pet. Gaz. t. 11. f. 3" was in the place of the delusive figure of d'Argenville: the variety *d* was a subsequent addition.

*N. POLITA.* *N. lævis*, labiis dentatis.

The *l* in the synonym of Rumphius was a misprint for the written *I*.

*N. PELERONTA.* *N. striata*, labiis dentatis, interiore planiusculo rugoso.

The erroneous synonym was added, along with the name *peleronta*, to the written details: *N. rufa* was the original appellation.

*N. ALBICILLA.* *N. striata*, labiis subdentatis, interiore tuberculato.

*N. HISTRIO.* *N. sulcata*, transversim striata, labio interiore dentato.

The name, and the synonym, were added by Linnæus to the written details.

*N. PLICATA.* *N. sulcata*, labiis profunde dentatis, interiore rotundato, exteriore utrinque dentibus acutis conicis.

The variety alluded to was a subsequent addition. The details of the 'Museum' had been quoted, in anticipation, for this species.

*N. GROSSA.* *N. sulcata* labiis dentatis, interiore convexo rugoso.

N. CHAMÆLEON. *N. sulcata*, labiis dentatis, interiore rugoso tuberculato.

"Habitat in Banda", and "compositis" after "subtilissimis", are the unprinted additions.

N. UNDATA. *N. sulcata*, labiis dentatis, interiore rugoso, tuberculato.

The erroneous figure of Gualtieri was not cited when the description was drawn up, but added to the details, along with "confluentibus. *Spira acuta prominens*", when the present name was substituted for the earlier *nebulata*.

N. EXUVIA. *N. sulcata*, labiis dentatis, interiore denticulato.

### HALIOTIS.

Testa univalvis, patens, convexa. *Spira obsoleta*, lateralis. Foramina lateralalia pervia.

H. MIDÆ. *H. subrotunda*, utrinque nitida.

*Humana* was the intended specific appellation.

H. TUBERCVLATA. *H. subovata*, rugis transversis tuberculatis.

The reference to Lister was an emendation.

H. STRIATA. *H. ovata*, transversim rugosa, longitudinaliter striata.

No name was attached to either this or any member of the genus, except the first.

H. VARIA. *H. ovata*, striis longitudinalibus, majoribus tuberculatis.

H. MARMORATA. *H. ovata*, striis longitudinalibus, transversis obsoletis.

H. ASININA. *H. oblonga*, extra foramina angulata, striis elevatis.

H. PARVA. *H. ovata*, angulo inter foramina et spiram.

All the headings in this genus are similar to those in the 'Systema'.

### PATELLA.

Testa conica, convexa. *Spira regularis nulla vera*.

The limits of this genus were precisely those of the printed edition.

P. EQUESTRIS. *P. ungue fornicali nutante*.

P. NERITOIDEA. *P. integra ovata*, apice subspirali, labio laterali.

"Supra" preceded "convexa", and the "fere" was before "apice".

P. CHINENSIS. *P. conica latior lævis*, labio interno laterali.

This was an addition to the original catalogue.

P. PORCELLANA. *P. basi interne labiata*, pone mucronato-subspiralis.

P. CREPIDULA was not mentioned in the manuscript.

P. SACCHARINA. *P. margine sinuato*, carinata, costis 7.

"Pet, Amb. t. 3. f. 3", and "Klein 117. t. 8. f. 4", were additional synonyms: both are in the 'Systema.'

P. BARBARA. *P. dentata*, costis 19 elevatis.

P. GRANULARIS. *P. margine dentato*, striis elevatis mucronibus imbricatis.

The erroneous reference to Gualtieri was not in the original.

P. GRANATINA. *P. margine angulato*, striis 11 lævibus.

"Interius" was the earlier reading of "subtus".

*P. TUBERCULATA.* *P. dentata conica tuberculata, postice sima.*

*Sima* was the earlier name in the MS., but was erased by Linnæus.

*P. LUTEA.* *P. integerrima striata, vertice mucronato inflexo.*

*P. UNGUIS.* *P. ovali-oblonga, apice emarginata, mucrone dorsali carinato.*

*Unguiformis* was the intended appellation.

*P. TESTUDINARIA.* *P. ovata glaberrima integerrima.*

*P. RUSTICA.* *P. integra, striis 50 obtusiusculis.*

*P. FUSCA.* *P. ovata integerrima, striis elevatis, vertice obtuso.*

The intended name was *cinereo-nigricans*.

*P. CRUCIATA.* *P. ovalis convexa integerrima, cruce picta.*

*P. RETICULATA.* *P. conica compressa, superficie reticulata.*

The suggestion I have elsewhere made that this uncertain shell might prove the European *Pedicularia*, induces me to remark that, although *P. Sicula* has been supposed to be a comparatively modern discovery, Favanne had long ago delineated it in the fourth plate (f. H. 1.) of his enlarged edition of d'Argenville.

*P. NIMBOSA.* *P. conica ovalis, costis confertis, vertice perforato.*

The discrepancy between the heading borrowed from the 'Systema', and the after details, is removed by the substitution of the original one. The shell was termed *perforata* (not *nimbosa*), and was wrongly identified by Linnæus with the striated brown *Fissurella* of the 'Systema'.

In addition to the printed species, the two following were present in the manuscript copy.

*P. SOLARIS.* *P. ovata integerrima, striis subnodosis, vertice acutiusculo.*

Testa ovata, diaphana, magnitudine extimi articuli digiti, margine integerrimo, lævis, striis subtilissimis inæqualibus numerosissimis, fasciis longitudinalibus rubris albo passim maculatis. Mucro acutiusculus obliquus albidus.

This was placed in the section having a simple margin.

*P. PERFOLIATA.* *P. conica, reclinata, perfoliata.*

Testa magnitudine coryli nucis, conica, sed cono retro inclinato, acutissima, alba, imbricata lamellis horizontaliter testam cingentibus. Margo integer, ovalis, antrorsum gibbus s. dilatatus. Cavitas profunde glabra.

This description very fairly suits the *Patella antiquata* of the twelfth edition of the 'Systema'.

## DENTALIUM.

Testa univalvis, subeyliudrica, utrinque aperta. Spira regularis nulla.

Although the *Serpulæ* were intermingled, it is clear that they did not accord with the above definition.

*D. ELEPHANTINUM.* *D. subulatum subarcuatum, angulatum.*

The synonymy of the tenth edition was appended, Lister excepted; the erroneous 13 of the reference to the *Gazophylaceum* was erased. *Deus elephantis* was the proposed trivial name.

D. ENTALIS. *D. subulato-cylindricum, subarcuatum.*

The terminal details were not furnished.

*D. dentalium* was the intended appellation.

### SERPULA.

In the original version of the 'Museum Ulricæ,' the members of this genus are not separated from the *Dentalia* (a proof, among many others, of the early date of this catalogue). Linnæus, however, when revising the transcript, had meditated the withdrawing of *S. arenaria* and *lumbricalis*, and constituted for them a nameless genus with the following definition:—

Testa tubulosa, isthmis concamerata, dissepimentis integris, nec perforatis, s. communicantibus.

This genus would have been the equivalent of the modern *Vermetus*.

S. TRIQUETRA. *D. triquetrum, adhærens.*

The reference to Gualtieri (whose figure was somewhat uncertain, yet probably designed for *Vermilia triquetra*) was queried. The proposed name was *D. parasiticum*.

S. CONTORTUPLICATA. *D. teretiusculum, depressum, rugosum.*

There was at first no name to the description of this shell; but it was added in the handwriting of Linnæus.

S. GLOMERATA. *D. teres glomeratum.*

The 'decussato-rugosa' of the 'Systema', applicable to the '*Vermetus subcancellatus*', the shell designed in that work, was not inserted. Gualtieri's figure is that of *Vermetus glomeratus*, for the colouring of which 'alba' would be a most inappropriate term.

S. LUMBRICALIS. *D. spira divaricata teretiusculum, integrum.*

D'Arg. t. 29. f. 1. was an additional synonym.

S. ARENARIA. *D. teres rectiusculum intestiniforme.*

Despite the name borrowed from Rumphius, the *Vermetus gigas* was the object defined in the tenth edition of the 'Systema'. The absence from the manuscript of the reference to Gualtieri's drawing of that shell, and "rectiusculum" in the written diagnosis, confirms the conclusion previously arrived at, that the *Septaria arenaria* of authors was the species intended in the 'Museum Ulricæ': it was subsequently termed *S. polythalamia* by Linnæus. The delusive "subangulata" of the supposititious diagnosis was of course absent.

The *V. gigas* was probably intended by the following unpublished description.

D. INTESTINIFORME. *D. teres flexuosum intestiniforme.*

Testa rudis crassitie digiti et ultro, flexuosa vario modo in diversis, integra, intus lavis.

S. ANGUINA.

The two very dissimilar *Siliquariæ* united under this appellation in the 'Museum Ulricæ,' were originally held distinct. The prickly variety was the unpublished type, and was thus defined:—

*D. ANGUINUM.* *D. spira inæquali angulata aculeata, sulco longitudinali perforata.*

Rumph. 125. t. 41. f. II. *Solen anguinus.*

Lang. Test. 6. *Tubulus vermicularis crista dentata.*

Testa albida, teretiuscula, angulis 9 obsoletis. Anfractus inæquales, nunc confertiores, nunc remotiores. Sulcus longitudinalis in superiore latere perforatus serie punctorum. Spinæ breves, fornicatæ ad angulos in latere inferiore.

Condensation, that peculiar faculty of the mental organization of Linnaeus, induced him to suppress this description, and attach the species, as a variety, to the form he had simultaneously characterized as

*D. spira elongata, teretiusculum, inerme, fissura longitudinali.*

Gualt. test. 10. f. z.

To this latter the published details belong, except the expression "*passim concatenata et quasi poris pertusa*" (which was a subsequent and fallacious addition), and the account of the variety.

*S. PENIS.* *D. teres, extremitate radiata disco cylindris poroso.*

"Bonan. i. f. 38.", indicated in the tenth edition of the '*Systema*', was among the synonyms. The "*Stigma, &c.*" was an addition; so too were "*lævis*," "*tubulosis*," and "*æqualibus*". The term "*hemisphærico*" has replaced the earlier "*convexo*."

In addition to the published species, the *S. Spirorbis* of the '*Systema*' appears to have been indicated as

*D. PLANORBÆ.* *D. spira plana, adhærens.*

It. W. Goth. 170. *Dentalium testa spirali plana adhærente.*

Planc. Conch. 13. n. 3. *Vermiculus in littore Veneto foliis algæ adhærens.*

Testa minima, magnitudine nuper ab ovo exclusæ cochleæ, ejus formam omnino gerit, at plana omnino est, et altero latere omnino fuci foliis adhæret.

This was evidently different from the *Serpula planorbis* of the '*Systema*.'

Catalogue of the Dipterous Insects collected at Makassar in Celebes, by Mr. A. R. WALLACE, with Descriptions of New Species. By FRANCIS WALKER, Esq, F.L.S.

(Read June 2nd, 1859.)

Fam. CULICIDÆ, *Haliday.*

Gen. MEGARHINA, *Desvoidy.*

1. MEGARHINA IMMISERICORS, n. s. *Mas.* Nigra, squamosa, capite thoraceque viridibus, hujus disco eupreo, proboscide palpis pedibusque purpureis, femoribus subtus fulvis, tarsis intermediis albo bifas-

ciatis, tarsis posticis albo unifasciatis, pectore argenteo, abdomine cyaneo fasciculis lateralibus albis subapicalibus nigris apicalibus auratis, alis subcinereis apud costam nigricantibus.

*Male.* Black. Head and thorax with green metallic scales; disc of the latter with cupreous scales. Proboscis, palpi, and legs purple; femora tawny beneath; middle tarsi with two white bands; hind tarsi with one white band. Pectus silvery. Abdomen blue, widening from the base to the tip, with small white tufts of hairs along each side; four larger black subapical tufts, two gilded apical tufts. Wings slightly greyish, blackish along the costa; veins black. Length of the body 5 lines; of the wings 8 lines.

### Gen. *CULEX*, *Linn.*

2. *CULEX* *OBTURBANS*, n. s. *Fam.* Nigricans, thoracis disco fusco, abdomine cupreo apice viridescente, gutta subapicali alba, fasciis ventralibus latis albis, pedibus subcupreo squamosis, femoribus subtus albis, alis cinereis.

*Female.* Blackish. Proboscis pale; its sheaths dark, longer than the thorax. Disk of the thorax with brown tomentum. Abdomen with cupreous tomentum, and with a slight greenish tinge towards the tip; a white subapical dot; underside with broad white bands. Legs with a cupreous tinge; femora whitish beneath. Wings grey; veins black, fringed. Length of the body  $2\frac{3}{4}$  lines; of the wings  $4\frac{1}{2}$  lines.

3. *CULEX* *IMPATIBILIS*, n. s. *Mas.* Subcupreo-niger, capite albo punctato, pectore albo guttato, abdomine fasciis interruptis albis, genubus albis, femoribus posticis albis apice nigris, tarsis intermediis basi albis, tarsis posticis albo bifasciatis, alis cinereis.

*Male.* Black, with a very slight cupreous tinge. Head with shining white points. Sheaths of the proboscis dark tawny, longer than the thorax. Pectus with shining white dots. Abdomen with interrupted shining white bands, which are most complete beneath. Knees white; hind femora white, with black tips; middle tarsi white at the base; hind tarsi with two white bands. Wings cinereous; veins black, fringed. Length of the body 2 lines; of the wings 3 lines.

4. *CULEX* *IMPELLENS*, n. s. *Fem.* Fuscus, subtus testaceus, proboscide nigricante albo-fasciato, pedibus pallidis, femoribus albidis apice obscurioribus, tarsorum articulis basi albis, alis cinereis.

*Female.* Brown, testaceous beneath. Proboscis blackish, with a white band, a little longer than the thorax. Legs with pale reflections; femora whitish, with darker tips; joints of the tarsi white at the base. Wings grey; veins black, fringed. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

### Gen. *ANOPHELES*, *Meigen.*

5. *ANOPHELES* *VANUS*, n. s. *Mas.* Cinereo-fuscus, gracilis, antennis

late plumosis, pedibus testaceis longis gracillimis, tarsorum articulis basi albis, alis subcinereis antice nigro punctatis.

*Male.* Cinereous brown, slender. Proboscis full half the length of the body. Palpi nearly half the length of the body. Antennæ broadly plumose. Legs testaceous, long, very slender; joints of the tarsi white at the base. Wings slightly cinereous, with black points on the fore part; veins black, fringed. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

Fam. TIPULIDÆ, *Haliday.*

Gen. LIMNOBIA, *Meigen.*

The following species, in the structure of the wing-veins, does not accord with any of Meigen's divisions of the genus. The mediastinal vein ends at about three-fourths of the length of the wing; the subcostal ends at seven-eighths of the length, and is connected with the radial by a transverse veinlet at its tip; the radial, the cubital, and the 1st and the 3rd externo-medial are long and of equal length; the 2nd externo-medial springs from the 1st, at one-fourth of its length; the 3rd externo-medial is connected by a transverse veinlet near its base with the subanal.

6. LIMNOBIA IMPONENS, n. s. Ochracea, palpis antennisque nigricantibus, his thoracis dimidio brevioribus, thorace antico valde elongato et attenuato, abdomine piceo, alis subcinereis longis angustis, stigmatе nigricante longissimo, halteribus piceis basi testaceis.

Ochraceous. Proboscis, palpi, and antennæ blackish, the latter moniliform setaceous, not half the length of the thorax. Thorax much elongated and attenuated in front. Abdomen piceous. Wings greyish, long narrow; veins black, testaceous at the base and along the costa from the base to the stigma, which is blackish and very long; halteres piceous, testaceous at the base. Length of the body 7 (?) lines; of the wings 16 lines.

Gen. TIPULA, *Linn.*

7. TIPULA INFIDENS, n. s. *Fæm.* Fusca, capite apud oculos subtusque cinereo, antennis basi testaceis thorace brevioribus, thorace vittis quatuor ochraceis, abdominis apice ochraceo, pedibus fulvis longissimis, femoribus apice fuscis, alis cinereis apud costam luridis.

*Female.* Brown. Head cinereous about the eyes and beneath. Antennæ setaceous, submoniliform, testaceous at the base, shorter than the thorax. Thorax with a slight cinereous tinge, and with four dull ochraceous stripes. Abdomen ochraceous at the tip. Legs tawny, slender, very long; tips of the femora brown. Wings cinereous, lurid along the costa to the stigma, which is brown; veins black, tawny at the base. Length of the body 10 lines; of the wings 24 lines.



8. *TIPULA INORDINANS*, n. s. *Mas.* Fusca, capite pallide cinereo vitta fusca, antennis testaceis thorace valde longioribus, articulis basi nigris nodosis setigeris thorace vittis quatuor pallide cinereis, abdominis lateribus ventrequae testaceis, segmentis basi nigro postice albo-marginatis, pedibus nigris longissimis, femoribus dimidio basali testaceis apices versus albo fasciatis, tibiis albo fasciatis, tarsis albo bifasciatis, alis hyalinis striga costali subapicali nigricante, venis transversis nigro nebulosis.

*Male.* Brown. Head pale cinereous, with a brown stripe. Antennæ testaceous, slightly setaceous, much longer than the thorax; joints at the base black, nodose, setigerous. Thorax with four pale cinereous stripes; pectus pale cinereous. Abdomen testaceous beneath and along each side, thickened towards the tip; segments whitish at the base, black along the hind borders. Legs black, slender, very long; femora testaceous for half the length from the base, with a white subapical band; tibiæ with a white band beyond the middle; tarsi with two broad white bands. Wings hyaline, with a blackish costal subapical streak; veins and stigma black, the latter small; transverse veins and forked subapical vein clouded with black; veins testaceous. Length of the body 9 lines; of the wings 16 lines.

#### Gen. CTENOPHORA, *Fabr.*

9. *CTENOPHORA INCUNCTANS*, n. s. *Mas.* Atra, capite thoraceque læte ochraceis, antennarum ramis longis æqualibus subpilosis, abdomine basi ochraceo. *Fæm.* Thoracis disco saturate ochraceo. *Var. β.* Capite thoraceque saturate ochraceis, alis albido strigatis et guttatis. Deep black. *Male.* Head and thorax bright ochraceous. Antennæ with long equal slightly pilose branches. Abdomen ochraceous at the base. *Female.* Disc of the thorax deep ochraceous. *Var.* Head and thorax deep ochraceous. Wings with five whitish streaks and two exterior elongated whitish dots. Length of the body 8-10 lines; of the wings 18-22 lines.

10. *CTENOPHORA GAUDENS*, n. s. *Mas et Fæm.* Læte ochracea, abdomine apicem versus nigro, pedibus nigris, femoribus ochraceis apice nigris, tibiis fascia basali candida, alis nigricantibus basi ochraceis, fascia exteriore albida.

*Male and Female.* Bright ochraceous. Abdomen black towards the tip. Legs black; femora ochraceous, black towards the tips; tibiæ with a snow white basal band. Wings blackish, ochraceous at the base, with a whitish exterior band which is attenuated hindward. *Male.* Antennæ with long, equal, slightly pilose branches. Length of the body 7-10 lines; of the wings 14-16 lines.

Fam. STRATIOMIDÆ, *Haliday*.Gen. PTILOCERA, *Wied.*

- 11.
- Ptilocera smaragdina*
- .
- Walk. Dipt.*
- pt. 3. 525.

Inhabits also the Philippine Islands.

12. *PTILOCERA SMARAGDIFERA*, n. s. *Mas*. Nigra, thorace pubescente vittis duabus smaragdinis, lateribus purpurascentibus, abdomine nigricanti-cyanco squamis lateralibus viridibus, tarsis basi obscure rufescentibus, alis subhyalinis, dimidio basali antice nigricante postice cinereo.

*Male*. Black. Thorax thickly pubescent, purplish along each side, with two emerald green dorsal stripes. Abdomen blackish blue, with green scales along each side. Tarsi dark reddish towards the base. Wings nearly hyaline; basal half blackish in front, cinereous hindward; veins black, yellow along the costa exteriorly. Length of the body 5 lines; of the wings 8 lines.

Gen. HERMETIA, *Latr.*

13. *HERMETIA REMITTENS*, n. s. *Mas et Fæm.* Nigra, capite antico livido, antennis basi subtus lividis apice albis, thorace vittis tribus cinereis, abdomine æneo-nigro, tibiis basi tarsisque albidis, alis nigricantibus basi subhyalinis. *Mas*. Abdominis dimidio basali livido.

*Male and Female*. Black. Head livid in front; a whitish line along the eye on each side of the front. Antennæ livid beneath towards the base; apical joint elongate-fusiform, white at the tip, as long as all the other joints together. Thorax with 3 indistinct cinereous stripes. Abdomen slightly bronzed, livid for half the length from the base in the male. Tibiæ at the base and tarsi whitish. Wings blackish, nearly hyaline at the base; halteres livid. Length of the body 78 lines; of the wings 12-14 lines.

Gen. STRATIOMYS, *Geoffr.*

14. *STRATIOMYS IMMISCENS*, n. s. *Mas*. Nigra, antennis fulvis parvis, scutelli margine postico spinisque pallide flavis, abdomine pallide flavo fasciis tribus dorsalibus latis nigris postice excavatis, pedibus flavescentibus, femoribus tibiisque nigro fasciatis, tarsis nigris, alis limpidis.

*Male*. Black. Head beneath and thorax with whitish down. Antennæ tawny, short. Scutellum along the hind border and spines pale yellow. Abdomen pale yellow, with three broad black dorsal bands, whose hind borders are much indented. Legs yellowish; femora and tibiæ with black bands; tarsi black. Wings limpid; veins brown; halteres pale. Length of the body 6 lines; of the wings 10 lines.

15. *STRATIOMYS FINALIS*, n. s. *Fæm.* Nigra, aureo-tomentosa, capite

subtus fulvo, antennis fulvis parvis, thorace vittis tribus nigris, thoracis margine postico spinisque pallide flavis, abdomine fulvo, pedibus pallide fulvis, alis limpidis.

*Female.* Black with gilded tomentum. Head tawny beneath, with two more or less tawny calli above the antennæ, which are tawny and short. Thorax with three black stripes; scutellum with the hind border and the spines pale yellow. Abdomen tawny, paler beneath. Legs pale tawny. Wings limpid; veins tawny; stigma testaceous. Length of the body 4 lines; of the wings 8 lines.

Gen. CLITELLARIA, *Meigen*.

16. CLITELLARIA FESTINANS, n. s. *Mas.* Nigra, aureo-tomentosa, antennis rufescenti-fulvis apices versus nigris, thorace fascia vittisque duabus aureis, scutelli spinis apice rufescenti-fulvis, abdomine vittis tribus macularibus aureis, pedibus luteis, alis luteis postice cinereis apice nigricantibus.

*Male.* Black, thick, with gilded down. Antennæ nearly as long as the breadth of the head; scape reddish tawny, fusiform, longer than the flagellum, which is black and lanceolate. Thorax and pectus with an interrupted downy band; thorax with two downy stripes, and with two lateral black spines; scutellum with a downy border, and with two stout spines, whose tips are reddish tawny. Abdomen with three rows of downy spots; the middle spots triangular; the lateral spots oblique. Legs and halteres luteous. Wings luteous along the costa, cinereous hindward, where the veins are bordered with black; tips broadly blackish; a black dot adjoining the luteous stigma. Length of the body 6 lines; of the wings 12 lines.

*Fem.?* Nigra, cinereo-tomentosa, antennis scapo intus fulvo, thoracis vittis duabus abdominisque maculis cinereis, femoribus tibiisque albidis apices versus nigris, tarsis basi albidis, alis obscure cinereis fascia lata subapicali nigricante.

*Female?* Black. Head shining, with white tomentum about the eyes. Antennæ shorter than the breadth of the head; scape linear, tawny on the inner side, much shorter than the flagellum, which is lanceolate. Thorax with two stripes of cinereous tomentum and with two lateral spines; scutellum with two stout spines; pectus with silvery cinereous tomentum. Abdomen with cinereous tomentose spots, which are disposed in three rows. Femora and tibiæ whitish black towards the tips; tarsi whitish at the base. Wings dark grey, with a broad blackish subapical band; veins and stigma black; halteres whitish. Length of the body 5 lines; of the wings 10 lines.

17. CLITELLARIA GAVISA, n. s. *Mas.* Nigra, albido-tomentosa, antennis testaceis apices versus nigris, thorace vittis duabus aureis, scutelli spinis apice flavis, abdomine vittis tribus macularibus aureis, pedibus flavis apices versus nigricantibus.

*Male.* Black, with whitish down. Antennæ shorter than the breadth of the head; scape testaceous, longer than the flagellum, which is

pilose. Thorax with two stripes of gilded tomentum, and with two lateral spines; spines of the scutellum yellow towards their tips. Abdomen with three rows of gilded tomentose spots, the dorsal spots triangular; the lateral spots oblique. Legs yellow; tarsi black towards the tips. Wings cinereous, blackish towards the tips and about the transverse veins; veins black, yellow towards the base; halteres yellow. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.  
*Fem.?* Cinereo-tomentosa, thoracis vittis abdominisque maculis cinereis, pedibus albidis, femoribus tibiis tarsisque apice nigris alis cinereis, fascia subapicali nigricante.

*Female?* With cinereous tomentum. Head white and shining about the eyes. Stripes of the thorax and spots of the abdomen cinereous. Legs whitish; femora, tibiae and tarsi black towards the tips. Wings cinereous with a blackish subapical band.

### Gen. OXYCERA, *Meig.*

18. OXYCERA MANENS, n. s. *Mas et Fem.* Nigra, cinereo-subtomentosa, antennis fulvis, pedibus pallide fulvescentibus aut lividis, alis vix cinereis. *Mas.* Thorace aureo-subtomentoso.

*Male and Female.* Black, slightly covered with cinereous tomentum. Head white and shining about the eyes. Antennae tawny. Thorax of the male slightly covered with gilded tomentum. Legs dull pale tawny or livid; hind tibiae black. Wings hardly cinereous; veins and stigma pale in the male, black in the female. Length of the body 3 lines; of the wings 7 lines.

### Gen. SARGUS, *Fabr.*

19. SARGUS REPENSANS, n. s. *Mas.* Testaceus, pubescens, vertice nigro, palpis lanceolatis, arista nigra, tibiis tarsisque posticis nigris, his albo cinctis, tarsis anterioribus apice nigris, alis cinereis apices versus nigricantibus.

Allied to S. AURIFER.

*Male.* Testaceous, pubescent. Vertex black. Palpi lanceolate, extending along two-thirds of the space between the mouth and the antennae; arista black. Hind tibiae and hind tarsi black, the latter white towards the tips, which are black; anterior tarsi with black tips. Wings cinereous, blackish towards the tips; veins black, testaceous at the base. Length of the body 9 lines; of the wings 20 lines.

20. SARGUS REMEANS, n. s. *Fem.* Niger, pubescens, thorace purpurascens-nigro, vittis duabus lateralibus pectoris disco tibiisque anterioribus supra sordidè albidis, alis nigricantibus. *Mas.?* Antennis piceis, thorace purpurascens-cupreo, pectore livido, abdominis segmentis albido-marginatis, alis fusciscentis, cinereis extus albido-stri-gatis.

Allied to S. TENEBRIFER.

*Female.* Black, pubescent. Head wanting. Thorax purplish black, with a dingy whitish stripe along each side; disk of the pectus dingy whitish. Anterior tibiæ dingy whitish above. Wings blackish; veins black; halteres dingy whitish, with blackish knobs. Length of the body 9 lines; of the wings 20 lines.

*Male?* Black. Head whitish about the mouth. Antennæ piceous. Thorax purplish cupreous, with a dingy whitish stripe along each side; pectus livid. Abdomen with two lanceolate apical appendages; hind borders of the segments whitish. Wings brownish cinereous, with slight whitish streaks on the exterior areolets. Length of the body 7 lines; of the wings 16 lines.

21. *SARGUS REDHIBENS*, n. s. *Fæm.* Cyaneus, antennis fulvis, thoracis lateribus anticis purpurascens, abdomine purpureo, pedibus albidis, tibiis posticis femoribusque nigricante strigatis, alis cinereis.  
*Var. β.* Vertice purpureo, thorace viridi.

*Female.* Blue. Antennæ tawny. Thorax purplish on each side in front. Abdomen purple, much broader than the thorax. Legs whitish; femora with a blackish streak above towards the tips; hind tibiæ with a blackish apical streak. Wings cinereous; veins black; stigma blackish. Halteres tawny. *Var. β.* Vertex purple. Thorax green. Length of the body  $3\frac{1}{2}$ –4 lines; of the wings 7–9 lines.

This may be a local variety of *S. metallinus*, but differs from that species by the dark marks on its hind legs, and by the wing-veins being black at the base.

22. *SARGUS MACTANS*, n. s. *Fæm.* Cupreo-viridis, abdomine cupreo, pedibus testaceis, tibiis posticis basi nigris, alis cinereis apices versus obscurioribus.

*Female.* Cupreous green, with cinereous down. Head wanting. Abdomen cupreous. Legs testaceous; hind tibiæ black for half the length from the base. Wings cinereous, darker from the discal areolet to the tips; veins black; stigma brown; halteres testaceous. Length of the body  $4\frac{1}{2}$  lines; of the wings 10 lines.

23. *SARGUS INACTUS*, n. s. *Mas.* Albido-testaceus, vertice nigro, thoracis disco scutellique apice purpureis, pectore maculis duabus cupreis, alis cinereis.

*Male.* Whitish testaceous. Vertex black. Disk of the thorax and scutellum towards the tip purple; pectus with a cupreous spot on each side. Wings cinereous; veins black; stigma dark brown; discal areolet shorter than that of the two preceding species. Length of the body 5? lines; of the wings 10 lines.

#### Gen. NERNA, Walk.

24. *NERNA IMPENDENS*, n. s. *Mas et Fæm.* Nigra, cinereo-subtomentosa, antennis tarsis posterioribus halteribusque testaceis, tarssi

anticis tibiisque piceis, alis cinereis apud costam anteriorem nigricantibus.

*Male and Female.* Black, with very slight cinereous pubescence. Antennæ, posterior tarsi, and halteres testaceous; tibiæ and fore tarsi piceous. Wings cinereous, blackish along the exterior part of the costa; veins and stigma black. Length of the body  $3\frac{1}{2}$  lines; of the wings 6 lines.

Gen. SOLVA, n. g.

*Corpus* lineare. *Proboscis* lanceolata. *Palpi* porrecti, lineares, caput non superantes. *Antennæ* lanceolatae. *Scutellum* incerne. *Abdomen* thorace longius. *Pedes* breviusculi, femoribus posticis incrassatis subserratis. *Alæ* sat angustæ.

Body linear. Head not broader than the thorax. Proboscis lanceolate. Palpi porrect, linear, rounded at the tips, not extending beyond the head. Antennæ lanceolate, shorter than the breadth of the head; joints indistinct. Thorax with a humeral callus and a linear callus on each side. Scutellum unarmed. Abdomen rather longer than the thorax. Legs rather short; hind femora incrassated, minutely serrated beneath; hind tibiæ very slightly curved, applied to the femora. Wings rather narrow; 1st and 2nd cubital veins rather long; length of the discal arcolet more than thrice its breadth; 3rd and 4th externo-medial veins connected towards the border; anal and subanal veins connected at some distance from the border.

25. SOLVA INAMENA, n. s. *Fem.* Cinereo-nigra, palpis, thoracis callis, scutello, abdominis lateribus, ventre pedibusque testaceis, antennis testaceis apice nigris, abdominis segmentis testaceo marginatis, alis subcinereis.

*Female.* Cinereous black. Mouth, palpi, calli of the thorax, scutellum, abdomen beneath and along each side except at the base, legs, and halteres testaceous. Antennæ testaceous except towards the tips. Hind borders of the abdominal segments testaceous. Wings greyish; veins black, testaceous towards the base. Length of the body  $2\frac{1}{2}$ –3 lines; of the wings 5–6 lines.

Gen. AMPSALIS, n. g.

*Fem.* *Corpus* elongatum, sublineare. *Antennæ* filiformes; flagellum lineare. *Thorax* longi-ellipticus; scutellum bispinosum. *Abdomen* ellipticum, thorace paullo latius non longius. *Pedes* longiusculi. *Alæ* angustæ.

*Female.* Body elongate, nearly linear. Head a little broader than the thorax. Eyes prominent. Palpi very short. Antennæ filiform, much longer than the breadth of the head; flagellum linear, about twice the length of the scape; joints indistinct. Thorax elongate-elliptical; scutellum armed with two obliquely ascending spines. Abdomen

elliptical, a little broader but not longer than the thorax. Legs rather long. Wings narrow; 1st cubital vein about one-fourth the length of the 2nd; four externo-medial veins complete; subanal vein curved, joining the anal vein at some distance from the border; discal areolet elongated and attenuated exteriorly; exterior side very short.

26. *AMPSALIS GENIATA*, n. s. *Fæm.* Ferrugineo-fusca, antennis nigris basi fulvis, thorace vittis duabus testaceis, scutello testaceo, apice spinisque et pectoris disco nigris, abdomine nigro, basi vittis duabus interruptis lateralibus pedibusque testaceis, alis cinereis apices versus fusciscentibus.

*Female.* Ferruginous brown. Antennæ black, tawny towards the base. Thorax with two testaceous stripes; scutellum testaceous; tip and spines black. Disk of the pectus black. Abdomen black; base and an interrupted stripe along each side testaceous. Legs and halteres testaceous. Wings grey, brownish in front towards the tips; veins black, testaceous at the base; stigma testaceous. Length of the body 6 lines; of the wings 11 lines.

#### Gen. *TRACANA*, n. g.

*Mas et Fæm.* *Corpus* elongatum. *Proboscis* lanceolata. *Antennæ* graciles, filiformes, capite transverso vix breviores. *Thorax* longi-ellipticus; scutellum bispinosum. *Abdomen* thorace paullo longius et latius. *Pedes* longiusculi. *Alæ* longæ, non latæ.

*Male and Female.* Body elongate. Head rather broader than the fore part of the thorax. Mouth lanceolate; palpi very short. Antennæ slender, filiform, about as long as the breadth of the head; 3rd joint long; 4th and following joints shorter. Thorax elongate-elliptical, with a distinct linear callus along each side; scutellum armed with two obliquely ascending spines. Abdomen elongate-elliptical, most attenuated towards the base, a little broader and longer than the thorax. Legs rather long. Wings long, not broad; 1st subcubital vein hardly one-third the length of the 2nd; four externo-medial veins complete; subanal vein curved, joining the anal vein near the border; discal areolet oblong, narrower exteriorly; exterior side very short.

27. *TRACANA ITERABILIS*, n. s. *Mas et Fæm.* Cinereo-nigra, capite antico fulvo, antennis albidis basi nigricantibus, pedibus fulvis, tibiis posticis femoribusque nigro-fuscatis, alis cinereis apices versus nigricantibus. *Mas.* Abdomine fulvo maculis lateralibus nigris. *Fæm.* Abdominis basi lateribusque fulvis.

*Male and Female.* Cinereous black. Head in front and calli of the thorax tawny. Antennæ whitish yellow, blackish at the base. Legs tawny; femora and hind tibiae banded with black. Wings grey, blackish towards the tips; veins black; halteres tawny. *Male.* Abdomen tawny, with some black spots on each side. *Female.* Abdomen tawny

at the base and along each side. Length of the body 5 lines; of the wings 10 lines.

Gen. ROSAPHA, n. g.

*Mas et Fæm.* Corpus angustum, elongatum, lineare. *Antennæ* graciles, filiformes, capite transverso longiores; articulus 3<sup>us</sup> fusiformis. *Scutellum* spinis duabus longis acutis armatum. *Abdomen* thorace vix longius aut latius. *Pedes* breves. *Alæ* angustæ.

*Male and Female.* Body narrow, elongated, linear. Mouth and palpi extremely short. *Antennæ* slender, filiform, longer than the breadth of the head; 3rd joint long, fusiform; joints of the flagellum indistinct. Thorax nearly linear, a little narrower in front; scutellum armed with two long, acute, hardly ascending spines. Abdomen subfusiform, narrowest towards the base, very little broader and longer than the thorax. Legs short. Wings narrow; 1st cubital vein nearly half the length of the 2nd; three complete externo-medial veins; subanal vein curved, joining the anal vein at some little distance from the border; discal areolet oblong; exterior side short.

28. ROSAPHA HABILIS, n. s. *Mas et Fæm.* Fulva, capite antennisque nigris, his basi fulvis, thoracis macula antica elongata, spinis apice, tibiis posticis apices versus tarsisque anterioribus nigris, tarsis posticis albis apice nigris, alis cinerascensibus apices versus nigris. *Fæm.* Abdomine supra nigro, basi lateribusque fulvis.

*Male and Female.* Tawny. Head black, white beneath along the eyes. *Antennæ* black; 1st, 2nd, and 3rd joints tawny. Thorax with an elongated black spot in front; spines of the scutellum black towards the tips. Hind tibiæ towards the tips and anterior tarsi black; hind tarsi white with black tips. Wings greyish, blackish in front towards the tips; veins black, tawny at the base; stigma ferruginous brown. *Female.* Abdomen black above, except at the base and along each side. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

Gen. RUBA, n. g.

*Fæm.* Corpus breve, crassum, latum. *Caput* parvum. *Antennæ* capite transverso vix breviores. *Scutellum* inerme. *Abdomen* globosum, thorace valde latius. *Pedes* breves. *Alæ* mediocres.

*Female.* Body thick, short, broad. Head much narrower than the thorax. Proboscis and palpi very short. *Antennæ* nearly as long as the breadth of the head; 3rd joint broader and longer than the flagellum, of which the joints are short, compact, and minutely setulose. Thorax a little longer than broad; scutellum unarmed. Abdomen globose, very much broader and a little longer than the thorax. Legs short. Wings moderately broad; 1st cubital vein not one-third of the length of the 2nd; four complete externo-medial veins; subanal



vein curved, joining the anal vein at some distance from the border ; discal areolet elongated exteriorly, irregularly triangular ; exterior side very short.

29. *RUBA INFLATA*, n. s. *Mas.* Testacea, valde pubescens, capite subtus guttis duabus nigris, alis sub-cinereis apices versus fuscescens, stigmatibus, stigmatibus flavescente.

*Male.* Testaceous. Head with a black dot on each side of the mouth. Flagellum of the antennæ black. Thorax and abdomen very pubescent. Wings slightly greyish, brownish towards the tips, and especially so in front ; veins black, testaceous at the base ; stigma yellowish. Length of the body 4 lines ; of the wings 7 lines.

### Gen. TINDA, n. g.

*Fam.* *Corpus* longiusculum, depressum. *Caput* oblongum, margine postico elevato. *Antennæ* capite transverso vix breviores ; articulus 3<sup>us</sup> fusiformis ; flagellum compressum, lanceolatum. *Scutellum* spinosum. *Abdomen* ellipticum, thorace latius non longius. *Pedes* breves, graciles. *Alæ* angustæ.

*Female.* Body somewhat elongated and depressed. Head somewhat oblong ; eyes nearly contiguous in front, diverging hindward, where there is an elevated margin. Mouth and palpi very short. Antennæ nearly as long as the breadth of the head ; 3rd joint fusiform, fully half the length of the flagellum, which is compressed and lanceolate, and with indistinct joints. Thorax slightly widening hindward ; scutellum with six ? very minute spines. Abdomen elliptical, broader but not longer than the thorax. Legs short, slender. Wings narrow ; 1st cubital vein less than one-third the length of the 2nd ; three complete externo-medial veins ; subanal vein joining the anal vein at some distance from the border ; discal areolet elongated, its exterior side very short.

30. *TINDA MODIFERA*, n. s. *Fam.* Nigra, antennis basi testaceis, pedibus testaceis, femoribus posterioribus supra obscurioribus, alis cinereis costam versus subnigricantibus.

*Female.* Black, hardly shining. Antennæ testaceous towards the base. Legs testaceous ; posterior femora somewhat darker above, except towards the base. Wings grey, slightly blackish along most of the costa ; veins black ; halteres testaceous. Length of the body 3 lines ; of the wings 5 lines.

### Gen. SARUGA, n. g.

*Mas.* *Corpus* contractum, breve, latum, crassum. *Vertex* gibbosus. *Oculi* magni. *Antennæ* brevissimæ ; articulus 3<sup>us</sup> rotundus ; arista apicalis, gracillima. *Thorax* gibbosus ; scutellum elevatum, conicum, postice productum. *Abdomen* transversum, thorace brevius. *Pedes* breves, graciles, simplices. *Alæ* breviusculæ.

*Male.* Body contracted, short, broad, thick. Head almost as broad as the thorax; vertex gibbous; eyes large, bare; mouth extremely short and small; antennæ very short, 3rd joint round; arista apical, very slender, a little longer than the antennæ; thorax gibbous; scutellum very gibbous, forming an upright cone, somewhat gibbous and conical hindward, where it is horizontal; abdomen a little broader than long, much shorter than the thorax; legs short, slender, simple; wings rather short; veins in structure like those of *Oxycera*.

31. *SARUGA CONIFERA*, n. s. *Mas.* Anthracina, antennis pedibusque albido-testaceis, thorace maculis duabus magnis flavo-tomentosis, femoribus nigris, genibus fulvis, alis albidis.

*Male.* Coal-black; antennæ and legs whitish testaceous; thorax with a large yellow tomentose spot on each side in front of the scutellum; femora black; knees tawny; wings whitish vitreous; veins and stigma whitish testaceous, the former black towards the base. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

### Fam. TABANIDÆ, *Leach.*

#### Gen. TABANUS, *Linn.*

32. *TABANUS SUCCURVUS*, n. s. *Fæm.* Nigricanti-fuscus, capite ferrugineo, collo longo lanceolato gracillimo, palpis piceis, antennis nigris, segmentorum abdominalium marginibus posticis subpallidioribus, tibiis subtus rufescenti-piceis, alis obscure cinereis apud venas fuscescentibus.

*Female.* Blackish brown. Head ferruginous, with a long lanceolate and very slender callus between the nearly contiguous eyes; under side clothed with black hairs. Proboscis black. Palpi piceous. Antennæ black; 3rd joint with a small horn. Hind borders of the abdominal segments slightly paler in the middle. Tibiæ reddish piceous beneath. Wings dark grey, brownish about the veins towards the base; veins black, piceous towards the base; fore branch of the cubital vein simple, nearly straight; halteres ferruginous, with luteous knobs. Length of the body 11 lines; of the wings 22 lines.

33. *TABANUS FACTIOSUS*, n. s. *Fæm.* Nigricanti-fuscus, capite testaceo, collo nigro gracili lanceolato, palpis piceis, thorace cinereo, abdomine rufescenti-piceo, maculis dorsalibus trigonis albidis, segmentorum ventralium marginibus posticis testaceis.

*Female.* Blackish brown. Head with testaceous tomentum and with a slender lanceolate black callus between the eyes. Proboscis black; palpi piceous. Antennæ with a very small horn. Thorax with cinereous down; pectus paler and more thickly clothed with paler down. Abdomen reddish piceous, with a whitish triangular spot on the hind border of each segment; hind borders of the ventral segments testaceous. Legs piceous; femora black; tibiæ tawny beneath. Wings grey, with a brownish tint in front; veins black, ferruginous towards

the base; fore branch of the cubital vein simple, nearly straight; halteres ferruginous, with whitish-yellow knobs. Length of the body 10 lines; of the wings 22 lines.

34. *TABANUS REDUCENS*, n. s. *Fæm.* Cinereo-niger, capite albido, callo nigro longo clavato, palpis albidis, antennis nigris vix dentatis, thorace vittis quatuor cinereis, abdomine vittis tribus albidis, segmentis ventralibus albido marginatis, tibiis fulvis apice nigris, alis cinereis striga subcostali nigricante, halteribus piceis apice testaceis.

*Female.* Cinereous black. Head whitish, clothed with white hairs beneath; callus black, long, clavate; palpi whitish; antennæ black, with an extremely small tooth; thorax with four cinereous stripes; pectus cinereous; abdomen with three whitish stripes, the dorsal one much more conspicuous than the lateral pair; hind borders of the ventral segments whitish; tibiæ tawny with black tips. Wings cinereous, with a blackish sub-costal streak; veins black; fore branch of the cubital vein simple, nearly straight; halteres piceous, with luteous knobs. Length of the body 10 lines; of the wings 20 lines.

35. *TABANUS SPOLIATUS*, n. s. *Mas.* Cinereo-niger, albido tomentosus, capite cinereo, palpis testaceis, antennis nigris basi rufescentibus vix dentatis, thoracis lateribus fulvescentibus, abdomine rufescente maculis dorsalibus trigonis albidis, segmentis ventralibus albido marginatis, tibiis rufescentibus nigro lineatis, alis cinereis apud costam fusciscentibus, halteribus albidis.

Allied to *T. UNIVENTRIS* and to *T. INTERNUS*, but distinct.

This may prove to be the male of *T. reducens*, though it is very different in appearance. *Male.* Cinereous black, with whitish tomentum, which is visible when viewed horizontally; head cinereous; palpi testaceous, very short; antennæ black, reddish at the base, with an extremely small tooth; thorax dull-tawny along each side; abdomen reddish, with a small triangular whitish spot on the hind border of each segment; hind borders of the ventral segments whitish; tibiæ reddish with a black line; wings cinereous, brownish along the costa; veins black, ferruginous at the base; fore branch of the cubital vein simple, nearly straight; halteres whitish. Length of the body 9 lines; of the wings 16 lines.

36. *TABANUS IMMIXTUS*, n. s. *Fæm.* Cinereo-niger, capite albido, callo nigro longo angusto sublineari, palpis albidis, antennis nigris basi rufis vix dentatis, abdomine ferrugineo apice nigro maculis trigonis marginibusque posticis testaceis, tibiis fulvis, alis cinereis apud costam subluridis, halteribus testaceis.

*Female.* Cinereous black; head whitish; callus long, black, slender, nearly linear; palpi whitish; antennæ black, red at the base; tooth extremely small and obtuse; abdomen ferruginous, black towards the tip; each segment with a triangular spot and the hind border testaceous; tibiæ tawny; wings cinereous, slightly lurid along the costa;

veins black, ferruginous at the base; halteres testaceous. Length of the body 6 lines; of the wings 12 lines.

37. *TABANUS FLEXILIS*, n. s. *Fam.* Cinereus, testaceo tomentosus, callo nigro longo gracillimo, palpis testaceis, antennis ochraceis subdentatis apice nigris, abdomine ferrugineo fusco maculis dorsalibus trigonis marginibusque posticis testaceis, tibiis basi fulvis, alis cinereis apud costam subluridis fusco bifasciatis, halteribus testaceis apice albis.

*Female.* Cinereous, with testaceous tomentum; head with a black, long, extremely slender callus; palpi testaceous; antennæ ochraceous, with black tips and with a very small black tooth; pectus whitish; abdomen ferruginous brown; each segment with a large triangular spot and with the hind border testaceous; tibiæ tawny towards the base; wings cinereous, somewhat lurid along the costa, with two irregular brown bands; 1st band short, discal, 2nd abbreviated hindward; veins black, ferruginous at the base; fore branch of the cubital vein simple, nearly straight; halteres testaceous with white tips. Length of the body 8 lines; of the wings 16 lines.

Gen. *CHRYSOPS*, *Meigen*.

38. *CHRYSOPS FASCIATUS*, *Wied.* See Vol. I. p. 112.

Fam. *ASILIDÆ*, *Leach*.

Subfam. *MYDASITES*, *Walk.*

Gen. *MYDAS*, *Fabr.*

39. *MYDAS BASIFASCIA*, n. s. *Fam.* Atra, antennis clavatis, abdomine fascia basali flava apice nitente, femoribus tibiisque posticis rufescentibus, alis cinereis apud venas ochraceis.

*Female.* Deep black; antennæ clavate, a little longer than the breadth of the head; abdomen with a slender yellow band very near the base, shining at the tip; hind femora and hind tibiæ reddish; wings cinereous, ochraceous about the veins, which are also ochraceous. Length of the body 12 lines; of the wings 22 lines.

Subfam. *DASYPOGONITES*, *Walk.*

Gen. *DISCOCEPHALA*, *Macquart*.

40. *DISCOCEPHALA PANDENS*, n. s. *Mas.* Picea, proboscide palpisque nigris, pectore thoracisque lateribus albidis, abdomine subtus pallide cinereo maculis lateralibus nigris, pedibus fulvis, genibus nigris, tarsis piceis, alis fusciscentibus cinereo strigatis et marginatis, halteribus albidis. *Fam.* Abdomine fulvo, alis cinereis.

*Male.* Piceous; front facets of the eyes large; proboscis and palpi black; mystax with four bristles; pectus and sides of the thorax whitish; abdomen beneath pale-cinereous, with black shining spots along each side; legs tawny; trochanters and knees black; tarsi piceous; wings

brownish, cinereous along the hind border, and with cinereous streaks in the disks of the areolets; halteres whitish. *Female*. Abdomen and halteres tawny; wings cinereous. Length of the body 4-5 lines; of the wings 10-12 lines.

Subfam. LAPHRITES, *Walk.*

Gen. LAPHRIA, *Fabr.*

41. LAPHRIA CONCLUDENS, n. s. *Fæm.* Aurata, capite pilis flavis, antennis flavis articulo 3<sup>o</sup> rufescente fusiformi, thorace vittis tribus nigris, abdomine fulvo lituris duabus fasciæque interrupta fasciisque duabus ventralibus nigris, pedibus fulvis, alis cinereis apud apices nigricantibus, halteribus pallide flavis.

*Female*. Gilded; head clothed with pale-yellow hairs; mystax with several bristles; proboscis linear, tawny; antennæ yellow; 3rd joint reddish, elongate fusiform; thorax with 3 black stripes, the lateral pair abbreviated; abdomen tawny; 4th and 5th ventral segments with black bands; 4th dorsal segment with a slight black mark on each side; 5th with a widely interrupted black band; legs tawny; wings cinereous, blackish towards the tips; veins black, ferruginous towards the base; halteres pale yellow. Length of the body 11 lines; of the wings 20 lines.

42. LAPHRIA VULCANUS, *Wied.* See Vol. I. p. 10.

43. LAPHRIA TAPHIUS, *Walk. Cat. Dipt.* pt. 2, 380.

Inhabits also the Philippine Islands.

44. LAPHRIA REQUISITA, n. s. *Mas et Fæm.* Viridis, capite aurato, antennarum articulo 3<sup>o</sup> longi-fusiformi, femoribus posticis incrassatis, alis nigricantibus basi et apud costam cinereis, halteribus testaceis. *Mas.* Femoribus anterioribus incrassatis, halteribus ex parte nigricantibus. *Fæm.* Abdomine purpurascenti-cyaneo basi viridi.

*Male and Female*. Green; head gilded in front, with whitish hairs beneath; mystax with a few black bristles; third joint of the antennæ elongate-fusiform; hind femora incrassated. Wings blackish, cinereous near the base and along nearly half the length of the costa; veins black; halteres testaceous. *Male*. Anterior femora incrassated; halteres partly blackish. *Female*. Abdomen purplish blue, green towards the base. Length of the body 7-9 lines; of the wings 14-16 lines.

45. LAPHRIA PARTITA, n. s. *Mas.* Nigra, capite aurato, antennarum articulo 3<sup>o</sup> sublineari, thorace lineis tribus cinereis, lateribus ochraceo-pilosis, maculis duabus humeralibus testaceis, abdomine apice cyaneocenti-nigro dimidio basali ochraceo-piloso, pedibus aurato-pilosis, femoribus incrassatis, alis nigricantibus dimidio basali fere sublimpido, halteribus testaceis. *Fæm.* Antennarum articulo 3<sup>o</sup> longi-fusiformi.

maculis duabus humeralibus albidis, abdomine nigricanti-cupreo, dimidio basali cinereo piloso.

- Male.* Black; head brightly gilded above, clothed with luteous hairs beneath; mystax with some black bristles; 3rd joint of the antennæ nearly linear, conical at the tip, a little longer than the 1st and the 2nd together; thorax with three slender cinereous lines; sides with ochraceous hairs; two humeral testaceous spots; abdomen bluish-black towards the tip; 1st, 2nd, and 3rd segments with ochraceous hairs; legs with gilded hairs and with black bristles; femora incrassated, especially the hind pair; wings blackish, almost limpid for nearly half the length from the base, which is partly blackish; the blackish part emitting some streaks into the limpid part; veins black; halteres testaceous.
- Female.* Third joint of the antennæ elongate fusiform; two humeral whitish spots; 1st, 2nd, and 3rd abdominal segments with cinereous hairs; following segments blackish cupreous. Length of the body 7-9 lines; of the wings 14-16 lines.

46. *LAPHRIA COMPLENS*, n. s. *Fæm.* Nigra, capite argenteo, antennarum articulo 3<sup>o</sup> fusiformi, thorace strigis duabus anticis obliquis maculisque duabus pectoralibus argenteis, abdomine purpureo maculis duabus argenteis, pedibus purpurascanti-nigris, femoribus non incrassatis, alis nigricantibus, halteribus apice testaceis.

*Female.* Black; head silvery, with black hairs beneath; mystax with several black bristles; third joint of the antennæ fusiform; thorax with an oblique silvery streak on each side in front; pectus with a silvery spot on each side; abdomen purple, with a silvery spot on each side of the 4th segment; legs purplish-black; femora not incrassated; wings blackish; veins black; discal veinlet and third externo-medial vein nearly forming one straight line; halteres with testaceous knobs. Length of the body 7 lines; of the wings 12 lines.

47. *LAPHRIA DIOCTRIOIDES*, n. s. *Fæm.* Nigra, tenuis, linearis, facie pectoreque argenteis, antennis linearibus, abdomine maculis lateralibus pedibusque fulvis, femoribus posticis nigro fasciatis, tibiis tarsisque posticis nigris, alis cinereis, halteribus pallide flavis.

*Female.* Black, slender, linear; face silvery; mystax with four black bristles; antennæ slender, linear, nearly as long as the breadth of the head; pectus silvery; abdomen with tawny dots along each side; legs tawny; a black ring on each hind trochanter; hind femora with a black band; hind tibiæ and hind tarsi black, the latter tawny beneath; wings cinereous; veins black; halteres pale yellow. Length of the body 2½ lines; of the wings 5 lines.

Subfam. ASILITES, *Walk.*

Gen. *TRUPANEA*, *Macq.*

48. *TRUPANEA STRENUA*, n. s. *Fæm.* Nigra, robusta, capite fuscescenti-cinereo, pilis subtus flavescanti-cinereis, abdomine fuscescenti-

nigro fascia basali fascienlari alba apice nigro nitente, pedibus crassis, alis fusciscentibus vitta sordide albida, halteribus fulvis.

*Female.* Black, stout; head brownish cinereous, very thickly clothed beneath with yellowish cinereous hairs; epistoma very prominent; mystax with a few black bristles above and with many yellowish cinereous bristles below; palpi with short black bristles; 3rd joint of the antennæ elongate conical; thorax with black bristles hindward and along each side; pectus cinereous; abdomen brownish black, with a basal band of white tufts; tip black, shining; legs very stout; pulvilli reddish; wings brownish; radial areolet with a dingy whitish stripe; veins black; halteres tawny. Length of the body 11 lines; of the wings 22 lines.

49. *TRUPANEA CALORIFICA*, n. s. *Mas et Fæm.* Ochracea, capite aurato, antennis nigris, thorace vittato, abdomine maculis magnis transversis subquadratis nigris, pedibus rufis crassis, tarsis nigris, alis cinereis vitta sordide albida, halteribus fulvis. *Mas.* Pectore abdomineque cinereis, hujus fasciculo subapicali argenteo. *Fæm.* Pectore testaceo, abdomine fulvo.

*Male and Female.* Ochraceous; head gilded in front, thickly clothed beneath; epistoma prominent; mystax with numerous gilded bristles and above with a few black bristles; palpi with short black bristles; antennæ black; third joint fusiform; thorax with slender indistinct stripes; abdomen with a large black transverse subquadrate spot on each segment; legs red, very stout; tarsi black; wings cinereous; radial areolet with a dingy whitish stripe; veins black; halteres tawny.

*Male.* Head with whitish hairs beneath; pectus and abdomen cinereous, the latter with a silvery-white subapical tuft. *Female.* Head with gilded hairs beneath; pectus testaceous; abdomen tawny. Length of the body 9-11 lines; of the wings 18-20 lines.

### Gen. *ASILUS*, *Linn.*

50. *ASILUS DETERMINATUS*, n. s. *Mas et Fæm.* Cinereo-niger, capite subaurato, antennis nigris, thorace vittis tribus cinereis, pedibus fulvis robustis, femoribus nigro vittatis, tibiis apice tarsisque nigris, alis fuscis, halteribus testaceis. *Mas.* Abdomine pilis basalibus luteis. *Fæm.* Abdomine pilis basalibus cinereis dimidio apicali stylato.

*Male and Female.* Cinereous black; head slightly gilded in front, with pale hairs beneath; epistoma not prominent; mystax with many pale, and above with a few black bristles; antennæ black; third joint lanceolate; arista nearly as long as all the preceding joints; thorax with three cinereous stripes, the lateral pair dilated towards the humerus on each side; pectus cinereous; legs tawny, stout; femora striped above with black; tarsi and tips of the tibiæ black; wings brown; veins black; halteres testaceous. *Male.* Abdomen with luteous hairs towards the base. *Female.* Abdomen with cinereous hairs

towards the base; nearly half the apical part stylate. Length of the body 10-12 lines; of the wings 18-20 lines.

51. *ASILUS INTRODUCENS*, n. s. *Fam.* Cinereo-niger, capite aurato, antennis nigris, thorace vittis duabus lateribusque cinereis, abdomine fasciculis quatuor basalibus cinereis dimidio apicali stylato, pedibus nigris robustis rufo variis, alis fusciscentibus, halteribus fulvis. *Mas?* Capite argenteo, abdomine fascia basali fasciculari fasciaque subapicali albidis latis, alis obscure cinereis.

*Female.* Cinereous black; head gilded in front, with cinereous hairs beneath; epistoma slightly prominent; mystax with several gilded bristles, and above with a few black bristles: antennæ black; 3rd joint lanceolate, nearly as long as the arista: thorax with two cinereous stripes, which are dilated on each humerus; sides and pectus cinereous: abdomen with two cinereous tufts on each side at the base; nearly half the apical part stylate: legs black, stout; femora red beneath and partly above; tibiæ with a broad red band: wings brownish, somewhat paler towards the base and about the borders of the posterior areolets; veins black; halteres tawny.

*Male?* Head silvery in front; mystax with several white, and above with a few black bristles; abdomen with a broad whitish tufted band at the base, and with a broad whitish subapical band; wings dark cinereous, partly paler, as in the female. Length of the body 8-12 lines; of the wings 12-16 lines.

52. *ASILUS AREOLARIS*, n. s. *Mas.* Cinereo-niger, capite aurato, antennis nigris basi fulvis, thorace vittis tribus cinereis, abdomine apice nigro nitente segmentis cinereo marginatis, pedibus fulvis, tarsis posterioribus nigris, alis fusciscenti-cinereis pallido lituratis triente basali albidis, halteribus testaceis. *Fam?* Antennarum articulo 3<sup>o</sup> fusiformi, alis fusciscentibus hyalino lituratis.

*Male.* Cinereous black; head gilded in front, clothed with black hairs beneath; epistoma prominent; mystax with many gilded bristles, and above with a few black bristles; antennæ black, tawny towards the base; thorax with three slender cinereous stripes, sides and pectus cinereous; abdomen black and shining at the tip, hind borders of the segments cinereous; legs tawny; posterior tarsi black; wings brownish cinereous, with paler marks in most of the areolets, white on more than one-third of the length from the base; veins black, tawny towards base; halteres testaceous.

*Female?* Epistoma less prominent; third joint of the antennæ fusiform, hardly half the length of the arista; wings brownish; marginal areolets with a nearly colourless spot in each. Length of the body 10 lines; of the wings 18 lines.

53. *ASILUS TENUICORNIS*, n. s. *Fam.* Cinereus, capite argenteo, antennis testaceis parvis, thorace vittis duabus fusciscentibus, abdomine obscure cinereo segmentis testaceo marginatis, pedibus fulvis,



genubus tarsisque nigris, alis cinereis apice obscurioribus, halteribus testaceis.

*Female.* Cinereous; head silvery white in front; epistoma very slightly prominent; mystax with some white bristles, and above with very few black bristles: antennæ testaceous; 3rd joint conical, much shorter than the 1st joint, and not more than one-fourth of the length of the arista: thorax with two brownish stripes: abdomen dark cinereous; hind borders of the segments testaceous: legs tawny; tarsi, except at the base and knees, black: wings cinereous, dark cinereous towards the tips; veins black, tawny towards the base; halteres testaceous. Length of the body 8 lines; of the wings 14 lines.

Gen. OMMATIUS, *Illiger*.

54. OMMATIUS SCITULUS, n. s. *Mas et Fæm.* Fulvus, gracilis, capite cinereo antice albo, antennis nigris basi fulvis, thoracis disco cinereo-nigro, pectore testaceo, abdominis segmentis pallido marginatis, alis cinereis, halteribus testaceis.

*Male and Female.* Tawny, slender; head cinereous above, white in front; mystax with several white bristles; antennæ black, tawny towards the base. 3rd joint lanceolate, arista not longer than the 3rd joint; disk of the thorax cinereous black; pectus testaceous; hind borders of the abdominal segments pale; tarsi black towards the tips; wings cinereous; veins black, tawny towards the base; halteres testaceous. Length of the body 6-7 lines; of the wings 11-12 lines.

55. OMMATIUS STRICTUS, n. s. *Mas.* Niger, angustus, capite argenteo, pectore albido-cinereo, abdomine fusco maculis trigonis nigris, segmentis albido marginatis, pedibus fulvis, genibus tarsisque nigris, alis subcinereis extus nigricantibus, halteribus testaceis.

*Male.* Black, narrow; head silvery white in front; mystax with very few white bristles; third joint of the antennæ elongate-conical; arista a little longer than all the preceding joints together; pectus whitish cinereous; abdomen brown, each segment with a black triangular spot and with a whitish hind border; legs tawny; knees and tarsi black, the latter tawny at the base; wings greyish, exterior half blackish; veins black; halteres testaceous. Length of the body 4-4½ lines; of the wings 7-8 lines.

Gen. LEPTOGASTER, *Meigen*.

56. LEPTOGASTER MUNDA, n. s. *Mas.* Cinerea, capite argenteo, proboscide antennisque fulvis, thorace lineis duabus fuscis, abdomine longo gracili apicem versus subdilatato, segmentorum marginibus maculisque quatuor subapicalibus testaceis, pedibus fulvis, femoribus tibiisque posticis nigro fasciatis, alis subcinereis, halteribus testaceis.

*Male.* Cinereous; head silvery white; proboscis and antennæ tawny; thorax with two brown lines; abdomen long, slender, slightly dilated

towards the tip, hind borders of the segments testaceous, two testaceous spots on each side towards the tip; legs tawny, hind femora and hind tibiæ with a black band on each; wings slightly greyish; veins black, tawny at the base; halteres testaceous. Length of the body 6 lines; of the wings 8 lines.

Fam. LEPTIDÆ, *Westw.*

Gen. LEPTIS, *Fabr.*

57. LEPTIS FERRUGINOSA, *Wied.* See Vol. I. p. 118.

*Heliomeia ferruginea*, *Dolichall.*

Dr. Dolichall has described this species and several other Diptera in a Zoological Journal published in Java. I am unable to refer to this work, but have adopted the names with which he has ticketed the species in Mr. Wallace's collection.

*Heliomeia* has the aspect of *Leptis*, but is distinguished by the subanal and anal veins being united before they join the border of the wing, thus agreeing with *Chrysopila*, from which it differs in the shorter third joint of the antennæ, and in the more slender arista.

Gen. SURAGINA, n. g.

*Fam.* *Corpus* lineare. *Caput* thorace vix angustius. *Proboscis* porrecta, compressa, capitis latitudine paullo brevior. *Palpi* lanceolati, porrecti. *Antennæ* brevissimæ; articulus 3<sup>us</sup> rotundus; arista gracilis, nuda. *Abdomen* subdepressum, thorace non duplo longius, apice obtusum. *Pedes* nudi, inermes, longiusculi, sat graciles. *Alæ* mediocres, areola discali longissima.

*Female.* Body linear, moderately broad. Head almost as broad as the thorax; vertex and front of equal breadth. Proboscis porrect, compressed, a little shorter than the breadth of the head. Palpi lanceolate, contiguous to the proboscis. Antennæ very short; 3rd joint round; arista slender, bare, longer than the antenna. Thorax a little narrower in front. Abdomen somewhat flat, less than twice the length of the thorax, obtuse at the tip. Legs bare, unarmed, rather long and slender. Wings moderately long and broad; radial vein slightly curved; forks of the cubital vein a little longer than the preceding part; 3rd externo-medial vein inclined beyond the discal areolet towards the 4th, which is straight; subanal and anal veins united close to the border; discal areolet nearly six times longer than broad, its fore side hardly angular.

58. SURAGINA ILLUCENS, n. s. *Fam.* Cinereo-nigra, capite argenteo-cinereo supra atro, palpis antennisque nigris, thorace vittis duabus cinereis, abdomine basi cinereo maculis duabus magnis basalibus apiceque testaceis, pedibus nigris, femoribus testaceis nigro cinctis, tibiis intermediis luridis, alis fuscis postice cinereis albo bifasciatis et bistrigatis.

*Female.* Cinereous black; head silvery grey, deep black above; proboscis, palpi, and antennæ black; thorax with two cinereous stripes; pectus cinereous; abdomen cinereous at the base; two large basal and lateral spots and the tip testaceous; legs black, femora testaceous, anterior femora black towards the base, hind femora with a broad black band, middle tibiæ lurid; wings brown, cinereous along the basal part of the interior border; two white abbreviated bands and two white intermediate streaks; veins black; halteres testaceous, with black knobs. Length of the body 7 lines; of the wings 12 lines.

Fam. BOMBYLIDÆ, *Leach.*

Subfam. THEREVITES, *Walk.*

Gen. THEREVA, *Latr.*

59. *Thereva congrua*, *Walk.* See Vol. II. p. 90.

Subfam. BOMBYLITES, *Walk.*

Gen. ANTHRAX, *Fabr.*

60. *Anthrax Tantalus*, *Fabr. Ent. Syst.* iv. 260. 15.

Inhabits also Hindostan, China, and Java.

61. *Anthrax semiscita*, *Walk.* See Vol. I. p. 118.

62. *ANTHRAX PRETENDENS*, n. s. *Fœm.* Nigra, fulvo tomentosa, thorace strigis duabus albidis, abdomine fasciis albidis maculisque duabus apicalibus albis, alis subcinereis basi nigris apud costam nigricantibus, halteribus albidis.

*Female.* Black; head with tawny tomentum in front, cinereous behind and beneath; thorax with tawny hairs in front and on each side, a whitish streak on each side by the base of the wing; abdomen with whitish bands, and with a white spot on each side at the tip, sides with tawny hairs at the base; wings slightly cinereous, black at the base, blackish along nearly half the length of the costa; veins black; radial vein forming a right angle at its base, curved towards its tip; fore branch of the cubital vein deeply curved; externo-medial veins almost straight; subanal and anal veins approximate on the hind border; halteres whitish. Length of the body 6 lines; of the wings 12 lines.

This and the two following species belong to the group of which *A. hottentotta* is the type.

63. *ANTHRAX ANTECEDENS*, n. s. *Fœm.* Nigra, flavescens pilosa, capite cinereo, abdomine fasciis late interruptis guttisque duabus apicalibus albis, lateribus anticis albo pilosis, alis hyalinis basi nigricanti-fuscis.

*Female.* Black; head cinereous in front and beneath; thorax with pale-

yellowish hairs in front and on each side; abdomen with broadly interrupted white bands, a white dot on each side at the tip, sides with white hairs towards the base; wings hyaline, blackish brown at the base; veins black; radial vein curved towards the tip; fore branch of the cubital vein deeply curved; externo-medial veins straight; subanal and anal veins somewhat approximate on the hind border, Length of the body 4 lines; of the wings 8 lines.

64. *ANTHRAX CONGRUA*, n. s. *Mas.* Nigra, albo pilosa, capite abdomisque lateribus nigro pilosis, abdomine fasciis duabus pallidis, alis subcinereis basi et apud costam nigricantibus, litura costali basali argentea.

*Male.* Black; head and sides of the abdomen clothed with short black hairs; antennæ very short, 3rd joint round; thorax clothed with white hairs in front and along each side; abdomen with two slender pale bands; wings slightly greyish, blackish at the base and along half the length of the costa, which has a silvery mark at its base; veins black; radial vein curved towards its tip; fore branch of the cubital vein deeply curved; externo-medial veins straight; subanal and anal veins somewhat approximate on the hind border. Length of the body 3 lines; of the wings 6 lines.

65. *ANTHRAX DEMONSTRANS*, n. s. *Fem.* Nigra, flavescente pilosa, capite cinereo, abdomine fascia subinterrupta guttisque duabus apicalibus albis, lateribus nigro pilosis basi luteo pilosis, alis nigricantibus basi et apud costam nigris.

*Female.* Black; head with cinereous tomentum behind and beneath; thorax with yellowish hairs on each side; abdomen with a white middle band, which is almost interrupted in the middle and slightly dilated on each side, a white dot on each side at the tip; sides with black hairs, and at the base with luteous hairs; wings blackish, black at the base and along the costa; radial vein forming a rounded angle at its base, as deeply curved towards its tip as is the fore branch of the cubital vein, to which it is parallel; 1st and 2nd externo-medial veins undulating, 3rd nearly straight; subanal and anal veins approximate on the hind border. Length of the body 5 lines; of the wings 10 lines.

66. *ANTHRAX PRÆDICANS*, n. s. *Fem.*; Nigra, nigro pilosa, antennis brevissimis articulo 3<sup>o</sup> rotundo, pedibus piceis, alis nigricantibus, albido strigatis, apice et apud marginem posticum cinereis.

*Female.* Black; head and sides of the thorax and of the abdomen clothed with short black hairs; antennæ very short, 3rd joint round; legs piceous; wings blackish, dark grey at the tips and along the hind border; discal, pabrachial, 3rd externo-medial, and anal areolets with whitish streaks; radial vein undulating towards its tip; fore-branch of the cubital vein slightly curved; externo-medial veins straight; subanal and anal veins approximating closely on the hind

border ; hind side of the discal areolet forming a right angle, and emitting thence the stump of a vein. Length of the body  $4\frac{1}{2}$  lines ; of the wings 9 lines.

67. *ANTHRAX DEGENEREA*, Walk. See Vol. I. p. 15. *var. Mas et Fem.* Nigra, angusta, fulvo-pilosa, capite cinereo, antennarum articulo 3<sup>o</sup> conico, pectore subargenteo, abdomine fasciis duabus ventre pedibus halteribusque fulvis, tarsis nigris, alis fuscis, apice marginæ que postico cinereis.

*Male and Female.* Black, narrow, head cinereous ; 3rd joint of the antennæ conical ; arista very short ; thorax with tawny hairs ; pectus silvery cinereous ; abdomen with two lateral tawny stripes, which are broadest in the female ; underside, legs and halteres tawny ; tarsi black ; wings brown, long, narrow, cinereous towards the tips and along the hind border ; radial vein curved towards its tip : fore branch of the cubital vein slightly curved, sharply angular at its base ; externo-medial veins straight ; subanal and anal veins approximate on the hind border. *Male.* Hind femora with black tips ; angle of the fore branch of the cubital vein emitting the stump of a vein.

*Var. β. Female.* Sides of the abdomen less tawny ; wings dark brown, cinereous at the tips ; fore branch of the cubital vein deeply curved, with its angle emitting the stump of a vein. Length of the body  $3\frac{1}{2}$ –5 lines ; of the wings 8–12 lines.

This species is closely allied to *A. fervida*, and, like the two preceding species, approaches the Australian group (sub-g. *Neuria*), which is distinguished by the long wings with contorted veins.

68. *ANTHRAX PROFERENS*, n. s. *Mas.* Atra, angusta, abdominis lateribus basalibus albo-pilosis, alis longis atris apud marginem posticum exteriorem limpidis, puncto discali albo, litura exteriore transversa albida.

*Male.* Deep black, slender ; head clothed with short black hairs ; antennæ and arista very short ; 3rd joint round ; abdomen with white hairs on each side at the base ; wings long, deep black, limpid along the exterior part of the hind border ; a white point in the discal areolet, and a little transverse whitish mark at the base of the fore branch of the cubital vein ; the latter deeply curved. Length of the body 4 lines ; of the wings 12 lines.

Allied to the group of which *A. hyalacra* is the type.

### Gen. SYSTROPUS, Wied.

69. *SYSTROPUS SPHEGOIDES*, n. s. *Mas.* Niger, capite albido-testaceo, antennis apices versus lanceolatis, thorace strigis quatuor lateralibus pallide flavis, abdomine lurido basi et apicem versus nigro, petiolo longissimo, femoribus subtus tibiisque apice luridis, alis nigricante-cinereis, halteribus albidis nigro fasciatis.

*Male.* Black ; head white behind, whitish testaceous in front about the

eyes; proboscis longer than the breadth of the head, its sheaths diverging and convoluted at the tips; antennæ a little longer than the proboscis, lanceolate towards the tips; thorax with two pale-yellow streaks on each side, one in front, the other behind the wing; abdomen lurid, black at the base, above, and towards the tip, where it is fusiform; its petiole very long and slender; femora beneath and tibiæ towards the tips lurid; wings blackish grey; veins black; halteres whitish, with a black subapical band. Length of the body 7 lines; of the wings 8 lines.

Fam. DOLICHOPIDÆ, *Leach.*

Gen. PSILOPUS, *Meigen.*

70. *PSILOPUS SPECTABILIS*, n. s. *Mas.* Aurco-viridis, capite purpurascente-cyaneo, antice argenteo, antennis testaceis, thorace vittis tribus cupreis, scutello cyaneo, abdominis lateribus cupreis, pedibus flavis, alis albis, costa lituris duabus costalibus lutescentibus, halteribus testaceis.

*Male.* Bright golden green; head purplish blue, with silvery tomentum in front; antennæ testaceous; arista black, shorter than the thorax; thorax with three bright cupreous stripes; scutellum blue; pectus silvery; abdomen bright cupreous along each side; legs yellow; tarsi black towards the tips; wings white, brown along the costa and on more than one-third of the length from the tips, with the exception of the hind border; the costal brown part including two transverse lutescent marks, beyond which there is a brown band; veins black; fore branch of the præbrachial vein nearly straight; discal transverse vein straight; halteres testaceous. Length of the body 4 lines; of the wings 8 lines.

71. *PSILOPUS FILIFER*, n. s. *Mas.* Viridescens-cyaneus, capite pectoreque argenteis, antennis pedibusque nigris, arista longissima, abdomine viridi fasciis nigris, tibiis anterioribus albidis, alis subcinereis. *Fem.?* Viridis, capite cyaneo, tibiis anterioribus testaceis.

*Male.* Greenish blue; head and pectus with silvery white tomentum; antennæ black; arista much longer than the body; abdomen green, with a black band on the base of each segment; legs black, long, slender; anterior tibiæ dingy whitish; wings slightly cinereous; veins black; fore branch of the præbrachial vein much curved; discal transverse vein very slightly undulating.

*Female?* Bright green; head blue, its fore part and the pectus with silvery white tomentum; abdomen with black bands; anterior tibiæ testaceous; discal transverse vein straight. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

72. *PSILOPUS ÆSTIMATUS*, n. s. *Mas.* Viridis, capite pectoreque argenteis, antennis nigris basi testaceis, abdomine fasciis latis nigris, pedibus flavescentibus, femoribus posticis apice tarsisque nigris, alis subcinereis, halteribus testaceis.

*Male.* Bright green; head in front and pectus silvery white; antennæ black, testaceous at the base; arista about as long as the thorax; abdomen with a broad black band on the base of each segment; legs yellowish, stout; tarsi black; femora paler than the tibiæ; hind femora with black tips; wings greyish; veins black; cubital vein slightly curved; fore branch of the præbrachial vein much curved; discal transverse vein straight; halteres testaceous. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

73. *PSILOPUS ABRUPTUS*, n. s. *Mas.* Viridis, capite cyaneo, facie pectoreque subargenteis, antennis pedibus halteribusque nigris, abdomine cyanescente-viridi, alis cinereis.

*Male.* Bright green; head blue; its fore part and the pectus somewhat silvery; antennæ black; arista hardly longer than the thorax; abdomen bluish green; legs black; wings grey; veins black; fore branch of the cubital vein forming a much rounded right angle, from whence it is straight to its tip; discal transverse vein straight, parted by half its length from the border, and by less than its length from the fork of the cubital; halteres black. Length of the body 2 lines; of the wings 4 lines.

#### Gen. *DOLICHOPTUS*, *Latr.*

74. *DOLICHOPTUS CINEREUS*, n. s. *Mas.* Cinereus, capite albo, antennis fulvis, pectore albedo, abdomine fasciis æneo-nigris, pedibus testaceis, tarsis anterioribus apice nigricantibus, tibiis posticis apice tarsisque posticis nigris, alis cinereis, halteribus testaceis.

*Male.* Cinereous, not metallic; head white between the eyes; antennæ tawny; 3rd joint elliptical; arista black, much longer than the antennæ; pectus whitish; abdomen with an æneous black band on each segment; legs testaceous, stout; anterior tarsi blackish towards the tips; hind tarsi and tips of hind tibiæ black; wings grey; veins black; præbrachial vein forming a right angle at its flexure, much curved from thence to the border; discal transverse vein slightly bent outwards; halteres testaceous. Length of the body 3 lines; of the wings 5 lines.

75. *DOLICHOPTUS PRÆDICANS*, n. s. *Fæm.* Cinereus, capite pectoreque albis, antennis fulvis, thorace vitta apiceque viridibus, abdomine maculis lateralibus albis, pedibus testaceis, femoribus posticis nigro lineatis, alis cinereis basi nigricantibus, halteribus fulvis.

*Female.* Cinereous; head and pectus white; antennæ tawny; arista black, longer than the antennæ; thorax with a dorsal stripe and the hind part green; abdomen with white spots along each side; legs testaceous, stout; tibiæ beset with black spines; tarsi black towards the tips; hind femora with a black line; wings cinereous, blackish towards the base; veins black; præbrachial vein gently curved outwards at its flexure, straight from thence to the border; discal trans-

verse vein straight; halteres tawny. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

76. *DOLICHOPUS PROVECTUS*, n. s. *Fæm.* Viridis, capite pectoreque argenteis, antennis nigris latiusculis basi testaceis, thorace vittis duabus nigris, abdomine fasciis argenteis, pedibus nigris, robustis spinosis, tibiis testaceis, alis obscure cinereis.

*Female.* Bright green; head in front and pectus silvery white; antennæ black, rather broad, testaceous towards the base; 3rd joint conical; arista much longer than the antennæ; thorax with a black stripe on each side; abdomen with silvery white bands; legs black, stout, spinose; tibiæ testaceous; wings dark grey; veins black; præbrachial vein forming a very obtuse angle at its flexure, straight from thence to the border; discal transverse vein straight. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

77. *DOLICHOPUS PRÆMISSUS*, n. s. *Mas.* Obscure viridis, capite pectoreque cinereis, antennis nigris, abdomine viridescente-nigro, pedibus nigris vix spinosis, tibiis ferrugineis, alis obscure cinereis, halteribus fulvis.

*Male.* Approaches the *Psilopi* in some of its characters. Dark green; head in front and pectus cinereous; antennæ black, very small and short; 3rd joint conical; arista as long as the breadth of the head; abdomen greenish black; legs black, hardly spinose or setose; tibiæ ferruginous; wings dark grey; veins black; præbrachial vein hardly bent between the straight discal transverse vein and the border; halteres tawny. Length of the body 2 lines; of the wings  $3\frac{1}{2}$  lines.

78. *DOLICHOPUS PROVENIENS*, n. s. *Fæm.* Obscure viridis, capite albo, antennis nigris, thorace vittis duabus pectoreque cinereis, abdomine cyanescete-viridi fasciis cupreis, pedibus nigris, femoribus anterioribus apice tibiisque fulvis, alis nigricantibus, halteribus fulvis.

*Female.* Dark green; head white in front and about the eyes; antennæ black; 3rd joint round; arista shorter than the breadth of the head; thorax with two cinereous stripes; pectus cinereous; abdomen bluish green, with cupreous bands; legs black; tibiæ and tips of anterior femora tawny; wings blackish; veins black; præbrachial vein quite straight; discal transverse vein straight, parted by twice its length from the end of the subanal vein; halteres tawny. Length of the body 2 lines; of the wings 4 lines.

#### Gen. *CHRYSOTUS*, *Meigen*.

79. *CHRYSOTUS EXACTUS*, n. s. *Mas.* Obscure viridis, cinereo-tomentosus, antennis pedibusque nigris, abdomine obscure cupreo, tibiis anticis fulvis, alis cinereis.

*Male.* Dark green, with cinereous tomentum; antennæ black; 3rd joint conical; arista much shorter than the breadth of the head; abdomen dark-cupreous; legs black; fore tibiæ tawny; wings grey;



veins black; præbrachial vein hardly bent exteriorly; discal transverse vein parted by more than four times its length from the end of the subanal vein. Length of the body  $1\frac{1}{4}$  line; of the wings 2 lines.

Gen. DIAPHORUS, *Meigen*.

80. DIAPHORUS RESUMENS, *Wlk.* See Vol. 11. p. 93.

Fam. LONCHOPTERIDÆ, *Curtis*.

Gen. CADREMA, n. g.

*Mas.* Corpus breviusculum, sat gracile. Caput thorace vix angustius; facies subobliqua. Antennæ brevissimæ; arista apicalis, longa, subpubescens. Abdomen ovatum, thorace vix longius. Pedes posteriores robusti; tibiæ posticæ calcare apicali arcuata. Alæ angustæ, lanceolatae.

*Male.* Body rather short and slender; head nearly as broad as the thorax; face slightly oblique. Antennæ extremely short; arista long, apical, minutely pubescent. Abdomen oval, hardly longer or broader than the thorax. Posterior legs stout; hind tibiæ with a curved apical spur. Wings narrow, lanceolate; cubital vein and præbrachial vein parallel, the latter ending at the tip of the wing; discal transverse vein straight, ending at full thrice its length from the border and at nearly thrice its length from the præbrachial transverse.

81. CADREMA LONCHOPTEROIDES, n. s. *Mas.* Testacea, antennis luteis, thoracis disco et metathorace nigris, abdomine apicem versus nigricante, alis vitreis macula apicali nigricante.

*Male.* Testaceous; antennæ luteous; disk of the thorax and metathorax black; abdomen blackish towards the tip; wings vitreous, with a blackish apical spot; veins black, testaceous towards the base. Length of the body  $1\frac{3}{4}$  line; of the wings 4 lines.

Fam. PLATYPEZIDÆ, *Haliday*.

Gen. PLATYPEZA, *Meigen*.

82. PLATYPEZA GLAUDESCENS, n. s. *Mas et Fem.* Picco-nigra, capite gutta atra, thoracis disco cyanescente-einereo, abdomine nigro, pedibus halteribusque piecis, tarsis albidis, posticis dilatatis, alis vitreis.

*Male and Female.* Piecous black; head with a deep black dot in front; disk of the thorax with a bluish-einereous tinge; abdomen black; legs piecous; tarsi whitish; hind tarsi dilated; wings quite vitreous; veins black; discal transverse vein parted by nearly twice its length from the border, and by more than twice its length from the fork of the præbrachial vein; fore branch of the latter joining the termination of the costal vein at the tip of the wing, close to the end of the cubital vein; halteres piecous. Length of the body  $1-1\frac{1}{2}$  line; of the wings  $2-2\frac{1}{2}$  lines.

Fam. SIPPHIDÆ, *Leach.*Gen. CERIA, *Fabr.*

83. CERIA LATERALIS, n. s. *Mas.* Nigra, capite vittis guttisque duabus, thorace maculis octo, pectore fasciis duabus, abdomine maculis duabus basalibus fasciisque duabus flavis, antennarum petiolo pedibusque rufis, alis subcinereis, basi costa strigaeque fuscis, halteribus flavis.

*Male.* Black; head with two yellow stripes in front, and with a yellow dot on each side at the base of the antennæ; petiole of the latter reddish; 3rd joint elongate-fusiform: thorax with three yellow calli on each side; scutellum with two oblique fusiform yellow spots which are united hindward; pectus with a yellow band on each side; abdomen with a slender petiole which is as long as the terminal fusiform part; a yellow spot on each side of the base; hind borders of the 1st and 2nd segments yellow; legs red; tarsi piecous; wings greyish, dark brown at the base, whence a dark brown streak proceeds to the disk; costa dark brown, blackish exteriorly; veins black; halteres yellow. Length of the body 12 lines; of the wings 16 lines.

Gen. MILEZIA, *Latr.*

84. MILEZIA CONSPICIENDA, n. s. *Mas et Fem.* Nigra, capite flavo maculis duabus nigris, palpis antennisque rufescentibus, thorace vittis fasciis maculisque duabus, scutelli margine abdomineque fasciis tribus flavis, abdomine fasciis tribus chalybeis, pedibus luteis, femoribus nigro vittatis, tarsis nigris apice luteis, alis cinereis apud costam fuscis.

*Male and Female.* Black; head yellow, with an elongate black spot above the antennæ, and with another above the epistoma; mouth black; palpi and antennæ reddish; thorax with two yellow stripes; each of its sides in front with a large yellow spot, the latter connected with a band across the pectus; two yellow bands, the 1st interrupted; scutellum bordered with yellow; pectus with two yellow bands on each side; abdomen with three yellow bands and with three chalybeous bands; 3rd yellow band slightly interrupted; legs luteous; femora striped beneath with black; tarsi black, with luteous tips; wings grey, brown along the costa; veins black; halteres yellow. *Male.* Abdomen with a subapical interrupted band; 1st band notched on the hind side. *Female.* First abdominal band slightly interrupted. Length of the body 8-9 lines; of the wings 14-16 lines.

Gen. GRAPTOMYZA, *Wied.*

85. GRAPTOMYZA TIBIALIS, *Wlk.* See Vol. II. p. 95.

*Fam.?* Lutea, crassa, lata, pubescens, vertice et epistomatis linea nigris, thoracis maculis duabus, disco postico, scutelli pectorisque discis cupreo-nigris, abdomine fasciis tribus nigris, femoribus anterioribus tibiisque nigro fasciatis.

*Female?* Luteous, pubescent, broad, thick; vertex black; epistoma

conical, forked at the tip, with a black line; proboscis longer than the thorax, black towards the base; arista plumose; two large spots on the thorax, its disk hindward, disk of the scutellum and disk of the pectus cupreous black; abdomen highly arched, with three black bands which are produced and slightly interrupted in the middle; apical band very broad; tibiæ and anterior femora with black bands; wings with a luteous stigma. Length of the body 5 lines; of the wings 8 lines.

Gen. ERISTALIS, *Latr.*

86. *Eristalis crassus*, *Fabr. Ent. Syst.* IV. 281, 12.

Inhabits also Hindostan.

87. *Eristalis Asepus*, *Wlk. Cat. Dipt.* pt. 3, 625.

Inhabits also China.

88. *ERISTALIS BOMBOIDES*, n. s. *Mas.* Ater, capite albo, arista nuda, thorace pubescente fascia cinerea fasciaque chalybeo-nigra, pectore cinereo, abdomine fasciis quatuor chalybeo-nigris, vittis duabus ventralibus latis albidis, tibiis basi flavis, alis nigricante-fuscis cinereo marginatis, halteribus flavis.

*Male.* Deep black; head with black hairs on the front and with white tomentum in front and behind; arista simple; thorax thickly pubescent, having in front a cinereous band which is tawny on each side, and a chalybeous black hinder band; scutellum chalybeous-black; pectus cinereous; abdomen with four chalybeous-black bands; the 1st widely interrupted; under side with a broad short whitish stripe on each side; hind (and anterior?) tibiæ yellow at the base; wings blackish-brown, cinereous towards the tips and along the hind border; veins black; halteres yellow. Length of the body  $5\frac{1}{2}$  lines; of the wings 11 lines.

Gen. HELOPHILUS, *Meigen.*

The two following *Helophili* may be merely varieties of *H. quadrivittatus*.

89. *HELOPHILUS CONSORS*, n. s. *Mas.* Niger, thorace vittis quatuor flavis, scutello luteo, abdomine vittis tribus luteis tribusque chalybeis, tibiis basi luteis, femoribus posticis incrassatis, alis cinereis apud costam fusciscentibus, halteribus flavis.

*Male.* Black; thorax with four yellow stripes; scutellum luteous; pectus cinereous; abdomen with three luteous bands and with four chalybeous bands; 1st luteous band interrupted, very broad; 3rd and 4th slightly excavated on the hind side; tibiæ luteous towards the base; hind femora incrassated; hind tibiæ curved; wings cinereous, brownish along the costa; veins black; halteres yellow. Length of the body 5 lines; of the wings 9 lines.

90. *HELOPHILUS CONCLUSUS*, n. s. *Mas.* Niger, capite albo, antennis

rufescentibus, arista nuda, thorace vittis quatuor flavis, scutello fulvo, abdomine fasciis quatuor lineaque transversa flavis fasciaque chalybea, pedibus nigro-luteis, tarsis nigris, alis cinereis apud costam subfuscis, halteribus flavis.

*Male.* Black; head white, with a black callus above the antennæ, which are reddish; arista simple; proboscis black; thorax with 4 yellow stripes; scutellum tawny; pectus with a broad oblique pale yellow band on each side; abdomen with 4 yellow bands; 1st and 2nd bands very broad; 1st interrupted; 2nd interrupted except in front, where there is a yellow transverse line; 3rd and 4th narrow, with a chalybeous band along the hind border of the 3rd; legs luteous, shaded with black; tarsi wholly black; wings grey, slightly brown along the costa; veins black, tawny towards the base; halteres yellow. Length of the body 5 lines; of the wings 9 lines.

Gen. MERODON, *Fabr.*

91. MERODON INTERVENIENS, n. s. *Mas.* Fuscus, flavescens-cinereo tomentosus, capite testaceo, antennis nigris, arista nuda, scutello fulvo, abdomine fasciis septem ventreque testaceis, pedibus fulvis, femoribus nigro vittatis, femoribus posticis incrassatis, tibiis posticis nigris, alis cinereis litura costali nigricante, halteribus flavis.

*Male.* Brown; head with short black hairs on the vertex, white behind, pale testaceous, and with a brown stripe in front; proboscis and antennæ black; arista simple; thorax thickly clothed with yellowish cinereous down; scutellum tawny; pectus cinereous; abdomen cylindric-conical, with seven testaceous bands; under side testaceous; legs tawny; femora striped with black; hind femora incrassated; hind tibiæ curved, black; wings cinereous, with a blackish mark by the middle of the costa; veins black, halteres yellow. Length of the body 6 lines; of the wings 10 lines.

Gen. VOLUCELLA, *Geoff.*

92. VOLUCELLA DECORATA, n. s. *Mas.* Fulva, oculis thoraceque pubescentibus, hujus disco cupreo-nigro, abdomine cupreo-nigro fasciis tribus flavis, pedibus piceo-fulvis, tarsis piceis basi fulvis, alis vitreis, costa lutea extus fuscescens, halteribus apice niveis.

*Male.* Tawny; epistoma very prominent; eyes pubescent; arista broadly plumose; thorax pubescent; disk cupreous-black; abdomen cupreous-black, with three yellow bands; 1st band basal; legs slightly shaded with piceous; tarsi piceous, tawny at the base; wings vitreous, luteous and exteriorly brownish along the costa; veins tawny, black towards the tips; halteres with snow-white knobs. Length of the body 7 lines; of the wings 14 lines.

Gen. BARYTEROCERA, *Walk.* See Vol. I. p. 123.

93. BARYTEROCERA GIBBULA, n. s. *Fæm.* Cupreo-nigra, capite fla-

vescente vitta cupreo-nigra, antennis fulvis, thoracis lateribus fasciæque flavis, abdominis lateribus fasciis tribus flavis strigisque tribus flavis, pedibus flavis, tibiis posticis femoribusque nigris apice flavis, alis cinereis, litura costali fasciisque duabus exterioribus nigricantibus.

*Female.* Cupreous black; head in front yellowish with a cupreous-black stripe; antennæ tawny; 3rd joint long, linear, obtuse at the tip; thorax yellow along each side and with a yellow band in front of the scutellum; abdomen yellow along each side and with three yellow bands; 1st band entire; 2nd nearly interrupted; 3rd emitting a lanceolate streak in front and two hindward streaks which extend to the tip; legs yellow; femora and hind tibiæ black with yellow tips; wings cinereous, with a blackish mark by the middle of the costa, and with two exterior slender blackish bands; veins black; halteres yellow. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

Gen. EUMERUS, *Meigen*.

94. EUMERUS FIGURANS, n. s. *Fæm.* Niger, capite albo vitta cyanea, scutelli margine postico fulvo, abdomine nigro-æneo fasciis duabus albis, 2<sup>a</sup> interrupta, tarsis subtus genubusque testaceis, alis subcinereis.

*Female.* Black, nearly cylindrical; head whitish, with a dark blue stripe on the vertex; antennæ with whitish tomentum; 3rd joint somewhat dilated, rather broader than long; scutellum tawny along the hind border; pectus cinereous; abdomen æneous-black, minutely punctured, with two white bands, placed oblique with regard to the segments, the 2nd interrupted; tarsi beneath and knees testaceous; wings greyish; veins black; cubital vein much contorted; halteres testaceous. Length of the body  $5\frac{1}{2}$  lines; of the wings 6 lines.

Gen. SYRITTA, *St. Farg.*

95. SYRITTA ILLUCIDA, n. s. *Fæm.* Ænea, capite argenteo, vertice nigro punctis duobus nigris, antennis pallide rufis, abdomine fasciis duabus latis interruptis testaceis maculisque duabus subapicalibus albis, pedibus testaceis, femoribus tibiisque posticis nigris, his rufo fasciatis, alis subcinereis.

*Female.* Æneous; head silvery white; vertex black, with an elongated white point on each side; antennæ pale red; pectus and sides of the thorax whitish; abdomen with two broad interrupted testaceous bands; apical segment with a white spot on each side at the base; under side testaceous except near the tip; legs testaceous; hind femora and hind tibiæ black, the latter with a red band; wings greyish-vitreous; veins black. Length of the body  $3\frac{1}{2}$  lines; of the wings 5 lines.

Gen. BACCHA, *Fabr.*

96. BACCHA DISPAR, n. s. *Mas.* Cupreo-nigra, capite chalybeo-nigro vittis duabus flavis, antennis rufis, thorace maculis quatuor luteis, ab-

domine fasciis duabus arcuatis luteis, pedibus rufescentibus, alis subcinereis, costa fasciaque nigricante fuscis, halteribus fulvis. *Fem.* Scutello flavo apud discum nigricante, abdominis petiolo fulvo, fascia 2<sup>a</sup> non arcuata, apice chalybeo, pedibus testaceis, posticis nigro fasciatis.

*Male.* Cupreous black; head chalybeous black, with a yellow stripe on each side in front; antennæ red, very short; 3rd joint conical; arista black, short; thorax with two luteous spots on each side; the 1st pair joining a luteous band on each side of the pectus; abdomen petiolated, clavate, with two much-arched luteous bands; legs reddish; wings slightly cinereous, blackish-brown along the costa, and with an irregular blackish-brown band, which hardly extends to the hind border; veins black; halteres tawny.

*Female.* Scutellum yellow, with a blackish disk; abdomen much compressed, with a long slender linear tawny petiole; the 2nd yellow band not arched; tip chalybeous; legs testaceous; hind femora slightly banded with black; hind tibiæ black towards the tips. Length of the body  $4\frac{1}{2}$ –5 lines; of the wings 8–9 lines.

Gen. SYRPHUS, *Fabr.*

97. *Syrphus consequens*, *Wlk.* See Vol. I. p. 18.

Fam. MUSCIDÆ, *Latr.*

Subfam. TACHINIDÆ, *Walk.*

Gen. NEMORÆA, *Macq.*

98. *NEMORÆA AMPLIFICANS*, n. s. *Fem.* Cinereo-nigra, capite testaceo, frontalibus nigris, palpis fulvis, antennis piceis, thorace vittis quinque nigris, scutello ferrugineo, abdomine piceo fasciis duabus latis interruptis cinereis, alis cinereis basi et apud costam fuscis.

*Female.* Cinereous black, with black bristles; head testaceous, more cinereous beneath; frontalia black, slightly widening to the face, with a row of bristles along each side; facialia not bristly; epistoma not prominent; palpi tawny; antennæ piceous, not extending to the epistoma; 3rd joint linear, rounded at the tip, full twice the length of the 2nd; arista nearly twice the length of the 3rd, stout for full half its length; thorax with five slender black stripes, thickly beset with long stout bristles; scutellum ferruginous except towards its base; abdomen piceous, setose towards its tip; 2nd and 3rd segments with broad interrupted cinereous bands along their fore borders; legs stout, bristly; wings grey, brown at the base and in front; veins black; præbrachial vein forming a slightly obtuse angle at its flexure, from whence it is very slightly curved inward to its tip; discal transverse vein straight, excepting a very slight inward bend near its base, parted by rather more than half its length from the border, and from the flexure of the præbrachial; alulæ cinereous-white. Length of the body 8 lines; of the wings 14 lines.

99. *NEMOREA TENEBROSA*, n. s. *Fæm.* Cinereo-nigra, capite albedo, frontalibus nigris, oculis pubescentibus, palpis et antennarum articulo 2° rufescentibus, thorace lineis quinque nigris, scutello rufo, abdomine obscure rufescente tessellis cinereis, femoribus posticis fimbriatis, alis cinereis, basi costa et venarum marginibus obscure fuscis.

*Female.* Cinereous black, with black bristles; head whitish; frontalia black, slightly widening to the face, with a row of bristles along each side and beyond it; facialia bristly along most of the length; epistoma not prominent; eyes pubescent; palpi reddish; antennæ not nearly reaching the epistoma; 3rd joint linear, slender, obtuse at the tip, much less than twice the length of the 2nd, which is reddish; arista stout for full half its length, much longer than the 3rd joint; thorax with five black lines; scutellum red, black at the base; abdomen dark reddish, slightly tessellated with cinereous; legs black, bristly; hind femora fringed with short black hairs; wings grey, dark brown at the base, along the costa and along the black veins; præbrachial vein forming a right angle at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein much curved inward near its base, parted by much less than its length from the border and by rather less than its length from the flexure of the præbrachial; alulae lurid-cinereous. Length of the body 6 lines; of the wings 12 lines.

Gen. *MASICERA*, *Maq.*

100. *MASICERA DOTATA*, n. s. *Fæm.* Cinerea, capite albo, frontalibus atris, oculis nudis, proboscide palpisque fulvis, thorace vittis quatuor nigris, abdomine longi-elliptico fasciis cinereis, alis luridis angustis, dimidio apicali obscure fusco, margine postico cinereo, halteribus testaceis.

*Female.* Cinereous, beset with numerous long stout black bristles; head white, clothed behind and beneath with white hairs; frontalia deep black, slightly widening towards the face, with stout bristles along each side; facialia without bristles except by the epistoma, which is not prominent; eyes bare; proboscis and palpi tawny; antennæ nearly reaching the epistoma; 3rd joint slightly broader towards the tip, which is rounded, about four times the length of the 2nd; arista stout at the base, very much longer than the 3rd joint; thorax with four black stripes; abdomen elongate-elliptical, its bristles stouter than those of the thorax; a cinereous band along the fore-border of each segment; lips black, stout, bristly; wings lurid, narrow, dark brown on the exterior half, cinereous along the hind border; veins tawny, black exteriorly; præbrachial vein extending rather beyond the slightly acute angle which it forms at its flexure, much curved inward from thence to its tip; discal transverse vein undulating, parted by rather less than its length from the border and from the flexure of the præbrachial; alulae cinereous; halteres testaceous. Length of the body 6 lines; of the wings 12 lines.

101. *MASICERA HORRENS*, n. s. *Fæm.* Albido-cinerea, valde setosa, capite albo, facie obliqua, oculis pubescentibus, thorace vittis quatuor nigris, abdomine subfusiformi spinoso fasciis tribus latis subinterruptis albidis, alis cinereis basi et apud costam subfuscis, alulis albidocinereis.

*Female.* Whitish cinereous, thickly beset with long stout black bristles; head white, clothed behind and beneath with white hairs; frontalia deep black, hardly widening towards the face, with bristles along each side and beyond it; face oblique; facialia with bristles along nearly two-thirds of the length; epistoma not prominent; eyes pubescent; palpi black, rather long; antennæ nearly reaching the epistoma; 3rd joint linear, rounded at the tip, full four times the length of the 2nd; arista very much longer than the 3rd joint, stout for more than one-third of its length; thorax with four black stripes; abdomen nearly fusiform, more spinose than bristly, with three broad slightly interrupted whitish bands on the fore borders of the segments; legs black, stout, bristly; wings grey, slightly brown at the base and along the costa; veins black; præbrachial vein forming a somewhat rounded right angle at its flexure, near which it is much curved inward and is thence straight to its tip; discal transverse vein undulating, parted by about its length from the border and by much less than its length from the flexure of the præbrachial; alulæ whitish cinereous. Length of the body 7 lines; of the wings 12 lines.

102. *MASICERA IMMERSA*, n. s. *Fæm.* Albido-cinerea, capite argenteo, oculis nudis, palpis, antennis pedibusque nigris, thorace lineis quatuor nigris, abdomine nigro fasciis tribus latis interruptis cinereis, alis cinereis, alulis albidocinereis albo marginatis.

*Female.* Whitish cinereous, with a few black bristles; head silvery white, with white hairs behind and beneath; frontalia black, widening towards the face, with a row of bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; palpi black; antennæ not reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista slender, very much longer than the 3rd joint; thorax with four slender black lines; abdomen black, conical, not longer than the thorax, with three broad interrupted cinereous bands along the fore borders of the segments; legs black, stout; wings grey; veins black; præbrachial vein forming a slightly rounded and obtuse angle at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein slightly undulating, parted by much less than its length from the border and from the flexure of the præbrachial; alulæ whitish cinereous with white borders. Length of the body 4 lines; of the wings 7 lines.

103. *MASICERA PROGNOSTICANS*, n. s. *Fæm.* Cinerea, gracilis, capite albo, abdomine nigro cylindrico fasciis albis, alis cinereis, alulis halteribusque albis.



*Female.* Cinereous, slender; head white; frontalia deep black, linear, with stout bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; palpi short, slender; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, about six times the length of the 2nd; arista rather slender, not much longer than the 3rd joint; abdomen black, cylindrical, very much longer than the thorax, with a white band on the fore border of each segment; wings cinereous; veins black; præbrachial vein forming a slightly rounded and extremely obtuse angle at the flexure, straight from thence to the tip; discal transverse vein straight, parted by about its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ and halteres white. Length of the body  $2\frac{1}{2}$  lines; of the wings  $4\frac{1}{2}$  lines.

Gen. EURYGASTER, *Macq.*

104. EURYGASTER RIDIBUNDA, n. s. *Fam.* Cinerea, capite argenteo, oculis pubescentibus, palpis fulvis clavatis, antennis piceis, thorace lineis quatuor nigris, abdomine nigro fasciis tribus latis albido-cinereis, pedibus nigris, alis subcinereis basi et apud costam subluridis, halteribus fulvis.

*Female.* Cinereous, with black bristles; head silvery white in front and behind, clothed behind and beneath with white hairs; frontalia deep black, hardly widening towards the epistoma, with a few black bristles along each side and beyond; facialia without bristles; epistoma not prominent; eyes pubescent; palpi tawny, clavate; antennæ piceous, almost reaching the epistoma; 3rd joint linear, slightly rounded at the tip, nearly thrice the length of the 2nd; arista slender, very much longer than the 3rd joint; thorax with four black lines; abdomen black, conical, a little broader and longer than the thorax, with three broad whitish-cinereous bands, somewhat spinose towards the tip; legs black, hardly bristly; wings greyish, with a lurid tinge at the base and along part of the costa; veins black, tawny towards the base; præbrachial vein forming a rounded and obtuse angle at its flexure, nearly straight from thence to its tip; discal transverse vein hardly undulating, parted by little more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ cinereous; halteres tawny. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

105. EURYGASTER REMITTENS, n. s. *Fam.* Cinerea, capite albo, oculis pubescentibus, palpis, antennis pedibusque nigris, thorace lineis quatuor nigris, scutello rufo, abdomine nigro fasciis cinereis fere interruptis, segmenti 2<sup>i</sup> lateribus rufescentibus, alis cinereis basi fusciscentibus, alulis albidis.

*Female.* Cinereous, slightly bristly; head white, clothed behind and beneath with white hairs; frontalia deep black, widening towards the face, with a row of bristles along each side and beyond; facialia without

bristles; epistoma not prominent; eyes pubescent; palpi black, short; antennæ almost reaching the epistoma; 3rd joint slightly widening towards the tip, which is rounded; arista slender, very much longer than the 3rd joint; thorax with four black lines; scutellum red, black at the base; abdomen black, conical, somewhat pilose at the tip, hardly broader or longer than the thorax, with cinereous nearly interrupted bands; 2nd segment reddish on each side; legs black, slightly bristly; wings grey, brownish at the base; veins black; præbrachial vein forming a slightly obtuse angle at its flexure, from whence it is hardly curved inward to its tip; discal transverse vein very slightly undulating, parted by a little more than half its length from the border, and by about half its length from the flexure of the præbrachial; alulæ whitish. Length of the body 5 lines; of the wings 8 lines.

106. *EURYGASTER APTA*, n. s. *Fam.* Cinerea, capite albo, oculis nudis, palpis, antennis, pedibusque nigris, thorace vittis quatuor indistinctis, abdominis vitta dorsali et segmentorum marginibus posticis nigris, alis cinereis apud costam fusciscentibus, alulis albido-cinereis.

*Female.* Cinereous, with few bristles; head white; frontalia black, narrow, linear, with a row of bristles along each side and beyond; facialia without bristles; epistoma not prominent; eyes bare; palpi black; antennæ almost reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista slender, very much longer than the 4th joint; thorax with four indistinct black stripes; abdomen conical, especially setose towards the tip, very little longer than the thorax; 1st segment, hind borders of the other segments and dorsal stripe black; legs black; wings grey, brownish along the costa; veins black; præbrachial vein forming an obtuse angle at its flexure, hardly curved inward from thence to its tip; discal transverse vein slightly undulating, parted by much less than its length from the border, and by a little less than its length from the flexure of the præbrachial; alulæ whitish cinereous. Length of the body 4 lines; of the wings 7 lines.

107. *EURYGASTER CONGLOMERATA*, n. s. *Fam.* Cinereo-nigra, capite albo, oculis pubescentibus, palpis, antennis pedibusque nigris, thorace lineis quatuor anticis nigris, thorace postico abdomineque anthracinis, tibiis posticis subfimbriatis, alis cinereis, alulis testaceo-albis.

*Female.* Cinereous black; head white, with white hairs behind and beneath; frontalia deep black, linear, with a row of bristles along each side and beyond; facialia without bristles; epistoma not prominent; eyes pubescent; palpi black; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, six times the length of the 2nd; arista much longer than the 3rd joint, stout to half its length; thorax with four black lines; hind part and abdomen coal black, shining, the latter conical, not longer than the thorax, setose towards the tip; legs black;

hind tibiæ slightly fringed ; wings grey ; veins black ; præbrachial vein forming a hardly obtuse angle at its flexure, almost straight from thence to its tip ; discal transverse vein undulating, parted by much less than its length from the border, and by a little less than its length from the flexure of the præbrachial ; alulæ testaceous white, very large. Length of the body  $4\frac{1}{2}$  lines ; of the wings 8 lines.

108. *EURYGASTER PROMINENS*, n. s. *Mas*. Cinereo-nigra, capite albo, oculis pubescentibus, palpis, antennis pedibusque nigris, thorace lineis quatuor indistinctis, abdominis basi vitta dorsali et segmentorum marginibus posticis nigris, sentelli apice rufescente, abdomine segmenti 2<sup>i</sup> lateribus subrufescentibus, alis cinereis, alulis albis.

*Male*. Cinereous black ; head white, with white hairs behind and beneath ; frontalia deep black, widening to the epistoma, with a row of bristles along each side and beyond ; facialia without bristles ; epistoma not prominent ; eyes pubescent ; palpi black ; antennæ extending to the epistoma ; 3rd joint linear, narrow, rounded at the tip, full four times the length of the 2nd ; arista much longer than the 3rd joint, stout to nearly half its length ; thorax with four indistinct black lines ; scutellum reddish towards its tip ; abdomen nearly oval, cinereous, not longer than the thorax ; 1st segment, hind borders of the following segments, and dorsal stripe black ; 2nd segment slightly reddish on each side ; legs black ; wings grey ; veins black ; præbrachial vein forming a right angle at its flexure, near which it is very slightly curved inward, and is thence straight to its tip ; discal transverse vein hardly undulating, parted by much less than its length from the border, and by less than its length from the flexure of the præbrachial ; alulæ white, very large. Length of the body  $3\frac{1}{4}$  lines ; of the wings  $6\frac{1}{2}$  lines.

109. *EURYGASTER DEDUCENS*, n. s. *Fem*. Cinerea, capite albo, oculis nudis, palpis, antennis pedibusque nigris, thorace lineis quatuor, abdominis basi fasciisque tribus nigris, scutello rufescente, alis cinereis basi nigris, alulis albis.

*Female*. Cinereous, bristly, head white, with whitish hairs behind and beneath ; frontalia deep black, widening to the face, with black bristles along each side and beyond ; facialia without bristles, except by the epistoma, which is slightly prominent ; eyes bare ; antennæ reaching the epistoma ; 3rd joint linear, rather broad, slightly rounded at the tip, about four times the length of the 2nd ; arista much longer than the 3rd joint, stout to half its length ; thorax with four black lines ; scutellum reddish ; abdomen conical, not longer than the thorax, black at the base, and with three black bands on the hind borders of the segments ; wings grey, black at the base ; veins black, testaceous at the base, except along the costa ; præbrachial vein forming an obtuse angle at its flexure, slightly curved inward from thence to its tip ; discal transverse vein straight, except a slight curve at its base, parted

by a little more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulæ white. Length of the body  $3\frac{3}{4}$  lines; of the wings 7 lines.

110. *EURYGASTER CONTRACTA*, n. s. *Fæm.* Cinerea, brevis, capite albo, palpis, antennis pedibusque nigris, thorace vittis quatuor nigris, abdomine nigro fasciis tribus latis subinterruptis argenteo-cinereis, alis cinereis basi nigricantibus, alulis albis,

*Female.* Cinereous, short; head white; frontalia deep black, widening slightly towards the face, with stout bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; palpi and legs black; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the second; arista stout for almost one-third of the length; thorax with four black stripes; abdomen black, nearly oval, not longer than the thorax, with three broad slightly interrupted silvery cinereous bands; wings cinereous, blackish at the base; veins black; præbrachial vein forming an obtuse angle at its flexure, nearly straight from thence to its tip; discal transverse vein curved inward towards its base, parted by less than its length from the border, and by about its length from the flexure of the præbrachial; alulæ white. Length of the body  $2\frac{1}{2}$  lines; of the wings  $4\frac{1}{2}$  lines.

111. *EURYGASTER PROGRESSA*, n. s. *Fæm.* Fulva, capite subtus et apud oculos albido, antennis pallide luteis apice fusciscentibus, abdomine maculis tribus dorsalibus nigris, alis cinereis apud costam luridis apice fuscis, halteribus testaceis.

*Female.* Tawny, with black bristles; head testaceous, whitish about the eyes and beneath; frontalia pale luteous, widening to the epistoma, beset with bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; antennæ pale luteous, almost reaching the epistoma; 3rd joint linear, brownish towards the tip; arista stout to about one-third of the length; abdomen nearly oval, hardly longer or broader than the thorax, with three black dorsal spots; tarsi piceous; wings grey, lurid along the costa, brown towards the tips, except along the hind border; præbrachial vein forming a slightly obtuse angle at its flexure, much curved inward from thence to its tip; discal transverse vein undulating, parted by much less than its length from the border, and by about its length from the flexure of the præbrachial; alulæ and halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

#### Gen. *METOPIA*, *Meigen*.

112. *METOPIA INSPECTANS*, n. s. *Fæm.* Cinerea, capite magno argenteo subconico, facie perobliqua, thorace vittis quatuor, abdominis vitta dorsali et segmentorum marginibus posticis nigris; alis cinereis, alulis albis, halteribus piceis.

*Female.* Cinereous; head large, silvery, almost conical in front; frontalia black, linear, with a few bristles along each side; face very oblique; facialia without bristles; epistoma not prominent; eyes bare; proboscis and palpi black, very short; antennæ extending to the epistoma, 3rd joint linear, rounded at the tip, full six times the length of the 2nd; arista longer than the 3rd joint; stout to nearly half its length; thorax with four black stripes, the outer pair interrupted; abdomen conical, not longer than the thorax, hind borders of the segments and dorsal stripe black; legs black, rather short and stout; wings grey; veins black; præbrachial vein forming an almost right angle and emitting a branch at its flexure, from whence it is slightly curved inward to its tip; discal transverse vein straight, parted by much less than its length from the border and by very much less than its length from the flexure of the præbrachial; alulæ white; halteres piceous. Length of the body 3 lines; of the wings 5 lines.

113. *METOPIA INSTRUENS*, n. s. *Fæm.* Cinerea, capite subconico argenteo micante, facie perobliqua, palpis antennis pedibusque nigris, thorace vittis quatuor nigris, abdomine e maculis nigris trivittato, alis cinereis.

*Female.* Cinereous; head brilliant silvery, almost conical; face very oblique; facialia with bristles along each side; epistoma not prominent; eyes bare; palpi and legs black; antennæ reaching the epistoma, 3rd joint linear, rounded at the tip, about six times the length of the 2nd; arista longer than the 3rd, stout to about one-third of its length; thorax with four black stripes; abdomen with three rows of triangular black spots; wings cinereous; veins black; præbrachial vein forming an obtuse angle, and emitting a branch at its flexure, slightly curved inward from thence to its tip; discal transverse vein straight, parted by more than its length from the border and from the flexure of the præbrachial; alulæ white. Length of the body 3 lines; of the wings 5 lines.

Subfam. DEXIDES, *Walk.*

Gen. DEXIA, *Meigen.*

114. *DEXIA BASIFERA*, n. s. *Fæm.* Testaceo-alba, capitis antici lateribus palpisque fulvis, oculis nudis, antennis pallide luteis, thorace vittis quatuor nigris, abdomine fulvo fusiformi maculis trigonis nigris, macula fasciæque testaceis, pedibus nigris longis, femoribus fulvis apice nigris, tibiis ex parte fulvescentibus, alis cinereis apud venas nigricantibus, fascia basali obliqua alba, alulis albis.

Group of *D. longipes*.

*Female.* Testaceous white, narrow, bristly; head somewhat prominent; frontalia black, slightly widening towards the epistoma, with a few long stout black bristles on each side; facialia without bristles; epistoma not prominent; sides of the peristoma tawny and slightly pro-

duced; eyes bare; proboscis and palpi tawny, the former geniculated, rather long; antennæ pale luteous, 3rd joint lanceolate, not reaching the epistoma, thrice the length of the second; arista plumose: thorax with two slender deep black stripes and with two exterior broad blackish stripes; scutellum with six black spines: abdomen tawny, fusiform, longer than the thorax, with little black hairs, with several black spines, and with a triangular black spot on the hind border of each segment; 3rd segment with a testaceous spot at the base, 4th with a testaceous basal band: legs long, black; femora tawny, with black tips; tibiæ partly dark tawny: wings cinereous, blackish along the veins, with an oblique white basal band; costa black at the base; veins black, testaceous in the white part; præbrachial vein forming a slightly acute angle and emitting a short stump at its flexure, curved inward from thence to its tip; discal transverse vein undulating, parted by hardly more than half its length from the border, and by less than its length from the flexure of the præbrachial; alulæ white. Length of the body 5 lines; of the wings 10 lines.

*Mus.* Subaurato-cinerea, abdomine testaceo lanceolato longissimo fasciis maculisque trigonis nigris connexis, pedibus anticis longissimis, alis apud costam nigricantibus, venis vix nigricante marginatis.

*Male.* Pale gilded cinereous, narrow, bristly; frontalia piceous, widening much towards the epistoma, with bristles along each side; sides of the peristoma much produced; thorax with four deep black stripes, the outer pair rather broad; abdomen testaceous, lanceolate, twice the length of the thorax; hind border of each segment with a black band which is connected with a triangular black spot; legs very long, fore legs extremely long; wings blackish along the costa, hardly blackish along the veins; præbrachial vein curved slightly inward near its flexure, almost straight from thence to its tip. Length of the body 8 lines; of the wings 12 lines.

115. *DENIA INCLUDENS*, n. s. *Fam.* Atræ, capite apud oculos albo, palpis antennis pedibusque nigris, thorace vittis duabus cinereis, abdomine lanceolato fasciis tribus albis late interruptis, pedibus longiusculis, alis nigricanti-cinereis, halteribus testaceis.

*Female.* Deep black; head cinereous in front, white about the eyes; vertex narrow; frontalia widening to the face, with bristles along each side; facialia without bristles; epistoma not prominent; palpi slender; antennæ reaching the epistoma, 3rd joint narrow, linear, about four times the length of the 2nd; thorax cinereous on each side, and with two cinereous stripes; abdomen lanceolate, setose, nearly twice the length of the thorax, with three widely interrupted white bands; legs rather long; wings blackish grey; veins black; præbrachial vein forming a very obtuse and slightly rounded angle at its flexure, almost straight from thence to its tip; discal transverse vein almost straight, parted by hardly less than its length from the border, and by much more than its length from the flexure of the præbrachial; alulæ

whitish; halteres testaceous. Length of the body  $3\frac{1}{2}$  lines; of the wings 6 lines.

116. *DEXIA PRECEDENS*, n. s. *Fem.* Cinerea, capite albo lateribus anticis piceis, palpis pedibusque nigris, antennis testaceis, thorace vittis tribus nigris, abdomine basi lateribus fasciæque nigris, punctis lateralibus albis, pedibus longiusculis, alis cinereis, alulis albis.

*Female.* Cinereous; head white, piceous on each side in front; frontalia deep black, slightly widening to the face, with bristles along each side; facialia without bristles; epistoma not prominent; palpi and legs black; antennæ testaceous, not reaching the epistoma, 3rd joint not thrice the length of the 2nd; thorax with three black stripes, the lateral pair abbreviated hindward; abdomen a little longer than the thorax, black and with white points along each side, black at the base and with a black band on the hind border of the 2nd segment; legs rather long; wings cinereous; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, almost straight from thence to its tip; discal transverse vein nearly straight, parted by less than its length from the border, and by very much more than its length from the flexure of the præbrachial; alulæ white; halteres piceous. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

Gen. *TOROCCA*, n. g.

- Fem.* *Corpus* gracile, sublineare. *Proboscis* palpique brevissimi. *Antennæ* brevissimæ, arista nuda. *Thorax* brevis. *Abdomen* longissimum, thorace plus duplo longius. *Pedes* longissimi. *Alæ* angustæ.

*Female.* Body slender, nearly linear. Head as broad as the thorax. Proboscis and palpi very short. Antennæ very short, not nearly extending to the epistoma; 3rd joint linear, rounded at the tip, about twice the length of the 2nd; arista bare, stout towards the base, full twice the length of the 3rd joint. Thorax short. Abdomen very elongate-fusiform, more than twice the length of the thorax. Legs very long. Wings narrow.

117. *TOROCCA ABDOMINALIS*, n. s. *Fem.* Viridis, capite pectoreque albis, proboscide palpisque fulvis, antennis pedibusque nigris, abdomine fulvo segmentorum marginibus posticis vittaque dorsali nigris, alis nigricanti-cinereis, alulis albido-cinereis.

*Female.* Green, bristly; head and pectus white; frontalia deep black, widening to the face, with a row of bristles along each side; facialia without bristles; epistoma not prominent; eyes bare; proboscis and palpi tawny; antennæ black; abdomen tawny, with a few spines; hind borders of the segments black; 1st segment black at the base, and with a broad black stripe; legs black; wings blackish cinereous; veins black; præbrachial vein forming an almost right angle, and emitting a short stump at its flexure, nearly straight from thence to its tip; discal transverse vein very undulating, parted by about half its

length from the border, and by much less than its length from the flexure of the præbrachial; alulæ whitish cinereous. Length of the body  $5\frac{1}{2}$  lines; of the wings 8 lines.

Subfam. SARCOPHAGIDES, *Walk.*

Gen. SARCOPHAGA, *Meigen.*

118. *Sarcophaga invaria*, *Walk.* See Vol. III. p. 103.

119. *Sarcophaga aliena*, *Walk.* See Vol. I. p. 22.

120. SARCOPHAGA MENDAX, n. s. *Mas.* Cinerea, capite albo, palpis antennis pedibusque nigris, thorace vittisque lineisque duabus nigris, abdomine tessellato vittis tribus nigris, vittis lateralibus e strigis lanceolatis, alis cinereis, alulis albis.

*Male.* Cinereous; head white, clothed behind and beneath with cinereous hairs; frontalia deep black, widening towards the face; palpi and antennæ black; thorax with five black stripes, the exterior pair incomplete, the middle cinereous intervals interlined; abdomen tessellated, with three black stripes, the lateral pair forming lanceolate streaks on the 3rd and 4th segments; legs black, very stout; wings grey; veins black; præbrachial vein forming a right angle at its flexure, near which it is curved inward, and is thence almost straight to its tip; discal transverse vein slightly curved near each end, parted by much less than its length from the border, and from the flexure of the præbrachial; alulæ white. Length of the body 6 lines; of the wings 10 lines.

121. SARCOPHAGA INEXTRICATA, n. s. *Fæm.* Cinerea, capitis lateribus anticis, palpis, antennis pedibusque nigris, thorace vittis tribus lineisque duabus nigris, abdomine fasciis tribus subinterruptis albidis, alis cinereis, alulis albis.

*Female.* Cinereous; head with black hairs behind and beneath; frontalia black, broad, slightly widening towards the face; a deep black space on each side of the face; palpi black, rather long; antennæ rather short, not nearly reaching the epistoma, 3rd joint slightly plumose; thorax with three black stripes, the two middle cinereous intervals interlined; abdomen with three broad slightly interrupted whitish bands; legs black, very stout; wings grey; veins black, slightly blackish-bordered; præbrachial vein forming a right angle at its flexure, near which it is curved inward, and is thence straight to its tip; discal transverse vein very slightly undulating, parted by much less than its length from the border and from the flexure of the præbrachial; alulæ white. Length of the body 5 lines; of the wings  $8\frac{1}{2}$  lines.

Subfam. MUSCIDES, *Walk.*

Gen. IDIA, *Meigen.*

122. *Idia australis*, *Walk.* See Vol. III. p. 103.



123. *IDIA PROLATA*, n. s. (Group *Rhyncomya*, *Desvoidy*). *Fæm.* Viridis, sat angusta, capite testaceo frontibus facie maculisque duabus anticis nigris, antennis halteribusque testaceis, abdomine cyaneo purpureo cupreoque vario fasciis duabus aureo-viridibus, pedibus nigris, alis cinereis basi et apices versus fuscis.

*Female.* Green, rather narrow, with slight cinereous tomentum; head testaceous, white behind; frontalia and face black and shining, the former linear; a black spot on each side of the peristoma; epistoma rather prominent; eyes bare; antennæ testaceous, not near reaching the epistoma, 3rd joint about thrice the length of the 2nd; abdomen blue, tinged with purple and with cupreous, a little broader than the thorax, with two golden green bands which are widely interrupted above; legs black; wings grey, brown at the base and towards the tips, with the exception of the hind border; veins black; præbrachial vein forming a much rounded and very obtuse angle at its flexure, which is near the border, nearly straight from thence to its tip; discal transverse vein slightly curved outward, parted by much less than its length from the border, and by about its length from the flexure of the præbrachial; alulæ and halteres testaceous. Length of the body  $3\frac{1}{2}$  lines; of the wings 5 lines.

Gen. *MUSCA*, *Linn.*

124. *MUSCA PROSPERA*, n. s. (Gen. *Silbomyia*, *Macq.*). *Fæm.* Aurato-viridis, capite argenteo, facie palpis antennis pedibusque nigris, oculis nudis, pectore maculis duabus argenteis, abdomine spinoso, apice purpureo maculis duabus argenteis, alis nigricantibus basi et apud costam nigris, alulis albis. *Var. β.* Thoracis disco cupreo, abdomine subtus cyaneo-purpureo. *Var. γ.* Abdominis disco cupreo, palpis fulvis.

*Female.* Deep golden green, thickly beset with very stout bristles; head silvery white; vertex green on each side; frontalia pieceous, very broad, with long stout bristles on each side; facialia without bristles; face black, deeply keeled, the keel partly white; epistoma slightly prominent; eyes bare; palpi long, subelavate; antennæ almost reaching the epistoma, 3rd joint full four times the length of the 2nd; pectus with a silvery spot on each side; abdomen elongate-oval, a little longer than the thorax, with long stout spines hindward, purple at the tip, where there is a silvery spot on each side; legs black, very stout; wings blackish, black at the base and along part of the costa; veins black; præbrachial vein forming a rounded right angle at its flexure, near which it is curved inward, and is thence straight to its tip; discal transverse vein undulating, parted by more than half its length from the border and by less than half its length from the flexure of the præbrachial; alulæ white. *Var. β.* Disk of the thorax bright cupreous; abdomen blue and purple beneath. *Var. γ.* Like *Var. β*; palpi tawny; disk of the abdomen bright cupreous. Length of the body 7-8 lines; of the wings 12-14 lines.

125. *MUSCA DELECTANS*, n. s. (n. subg. *Isomyia*). *Fam.* Cuprea, capite cinereo lateribus anticis fulvis, palpis fulvis latiusculis, antennis rufescentibus, scutello aurato, viridi-abdominis fasciis pedibusque nigris, alis cinereis apud costam nigricantibus apud venas posticas subluridis, alulis albido-testaceis, halteribus fulvis.

*Female.* Bright cupreous, rather long; head cinereous, tawny and somewhat produced on each side of the peristoma; frontalia black, slightly widening towards the face, with a few bristles along each side; facialia without bristles; epistoma somewhat prominent; eyes bare; palpi tawny, rather broad; antennæ reddish, not near reaching the epistoma, 3rd joint about one-third of the length of the 2nd; scutellum mostly golden green; abdomen nearly oval, broader but hardly longer than the thorax, with a black band on the hind border of each segment; legs black; wings grey, blackish along the costa towards the base, slightly lurid along the hinder veins; veins black; præbrachial vein forming a slightly obtuse and rounded angle at its flexure, much curved inward from thence to its tip; discal transverse vein deeply undulating, parted by more than half its length from the border and by much more than half its length from the flexure of the præbrachial; alulæ whitish testaceous; halteres tawny. Length of the body 7 lines; of the wings 12 lines.

126. *MUSCA INGENS*, n. s. (Gen. *Calliphora*, *Desc.*). *Fam.* Nigricanti-cyanca, valde setosa, capite albo, palpis antennis pedibusque nigris, pectore cinereo, abdomine spinoso fasciis tribus argenteis late interruptis, alis nigricantibus margine postico cinereo, alulis albidis.

*Female.* Blackish blue, thickly beset with long stout bristles; head white; frontalia deep black, widening in front, with a few bristles on each side; facialia beset with bristles, except towards the frontalia; palpi and antennæ black, the latter reaching the epistoma, 3rd joint six times the length of the 2nd; pectus and sides of the thorax cinereous; abdomen a little longer and broader than the thorax, with spines towards the tip, and with three broadly interrupted silvery bands; legs black; wings blackish, cinereous along the hind border and in the disks of the hinder areolets; veins black; præbrachial vein forming a right and much rounded angle at its flexure, curved inward beyond, and thence nearly straight to its tip; discal transverse vein slightly undulating, parted by less than half its length from the border, and by full half its length from the flexure of the præbrachial; alulæ whitish. Length of the body 9 lines; of the wings 14 lines.

127. *MUSCA PROMITTENS*, n. s. (Gen. *Ochromyia*, *Macq.*). *Mas et Fem.* Fulva, capite albo, palpis testaceis, tibiis supra tarsisque apice piceis, alis cinereis basi luridis. *Flem.* Abdomine purpurascenti-cyanco basi fulvo.

*Male and Female.* Tawny with black bristles; head white; frontalia

pieceous, linear, with a few bristles along each side; facialia without bristles; epistoma rather prominent; eyes bare; palpi testaceous; antennæ almost reaching the epistoma, 3rd joint four times the length of the 2nd; abdomen of the female purplish blue, tawny towards the base, broader but not longer than the thorax; tibiæ above, and tarsi towards the tips, pieceous; wings grey, lurid towards the base; veins black, tawny towards the base; præbrachial vein forming a right and much rounded angle at its flexure, much curved inward from thence to its tip; discal transverse vein undulating, long, parted by more than half its length from the border, and by less than its length from the flexure of the præbrachial; alulae testaceous. Length of the body 4-5 lines; of the wings 8-10 lines.

128. *MUSCA FAVILLACEA*, n. s. (n. subg. *Anisomyia*). *Fam.* Fulva, longiuscula, capite antico palpisque testaceis, antennis cinereo-fulvis, thorace vittis tribus cinereis, abdomine nigro basi testaceo fasciis tribus argenteo-cinereis, alis cinereis. *Var. β.* Thorace cinereo, abdomine fulvo cinereo-tessellato segmentis nigro marginatis.

*Female.* Tawny, rather long, with black bristles; head testaceous in front, whitish and with whitish hairs beneath and hindward; frontalia extremely broad, with a cinereous line, beset with six bristles along each side; facialia without bristles; epistoma prominent; eyes bare; palpi testaceous; antennæ greyish tawny, reaching the epistoma, 3rd joint four times the length of the 2nd; thorax with three indistinct cinereous stripes; abdomen black, elongate-oval, a little longer and broader than the thorax, with a testaceous basal band, and with three silvery grey bands which are testaceous beneath, ventral segments wholly testaceous; wings cinereous; veins black, tawny towards the base; præbrachial vein forming a rounded and obtuse angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein slightly undulating, parted by a little more than half its length from the border, and from the flexure of the præbrachial; alulae testaceous. *Var. β.* Thorax cinereous; abdomen tawny, tessellated with cinereous, hind borders of the segments black. Length of the body 5-6 lines; of the wings 10-12 lines.

129. *Musca obtusa*, *Walk.* See Vol. III. p. 105.

130. *Musca flaviceps*, *Mucq.* See Vol. I. p. 23.

131. *MUSCA SELECTA*, n. s. (Gen. *Lucilia*, *Desv.*). *Fam.* Aureo-viridis, longiuscula, capite testaceo, epistomate elevato, palpis fulvis, antennis pallide rufis, thorace vittis tribus cupreis, pedibus nigris, alis nigricanti-cinereis margine postico cinereo, alulis albidis testaceo marginatis, halteribus fulvis.

*Female.* Bright golden green, rather long; head testaceous, cinereous and with whitish hairs behind and beneath; frontalia deep black, linear, thickly beset with bristles along each side; epistoma prominent; palpi

tawny; antennæ pale red, not near reaching the epistoma, 3rd joint less than thrice the length of the 2nd; thorax with three slender bright cupreous stripes; abdomen wanting; legs black; wings blackish grey, grey along the hind border; veins black; præbrachial vein forming a very obtuse and much rounded angle at its flexure, slightly curved inward between the flexure and the tip; discal transverse vein undulating, parted by more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alula whitish, with testaceous borders; halteres tawny. Length of the body 5 lines; of the wings 10 lines.

132. *MUSCA SPERATA*, n. s. (Gen. *Lucilia*, *Desc.*). *Mas.* Aureo-viridis, capite nigro-cinereo, proboscide palpis antennis pedibusque nigris, thoracis disco cupreo, alis cinereis basi et apud costam sub-luridis, alulis obscure cinereis.

*Male.* Golden green; head cinereous black; eyes bare; proboscis, palpi, and antennæ black, the latter not reaching the epistoma; disk of the thorax bright cupreous; abdomen shorter than the thorax; legs black; wings grey, with a lurid tinge at the base and along part of the costa; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, hardly curved inward from thence to its tip; discal transverse vein very slightly curved inward behind the middle, parted by much less than its length from the border, and by hardly less than its length from the flexure of the præbrachial; alula dark grey. Length of the body 4 lines; of the wings 8 lines.

133. *MUSCA INSCRIBENS*, n. s. (Gen. *Chrysomyia*, *Desc.*). *Fam.* Aureo-viridis, capite albo, palpis fulvis, antennis piccis, abdomine segmentorum marginibus pedibusque nigris, alis cinereis basi nigricantibus, alulis cinereo-albis.

*Female.* Deep bright green; head white; frontalia black, linear; palpi tawny; antennæ piccous, nearly reaching the epistoma; abdomen almost as long as the thorax, hind borders of the segments black; legs black; wings grey, blackish at the base; veins black; præbrachial vein forming an obtuse and rounded angle at its flexure, hardly curved inward from thence to its tip; discal transverse vein nearly straight, parted by little more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alula cinereous with white borders, the upper pair white. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

134. *MUSCA ELECTA*, n. s. (Gen. *Lucilia*, *Desc.*). *Mas et Fam.* Viridis, capite albo, palpis antennis pedibusque nigris, alis cinereis, alulis albido-cinereis. *Fam.* Frontis lateribus nigris. *Var. β, Mas.* Aureo-viridis.

*Male and Female.* Bright green; head white, that of the female black and shining on each side of the broad dull black frontalia; antennæ black, nearly reaching the epistoma; abdomen a little broader and shorter than the thorax; legs black; wings grey; veins black; præ-

brachial vein forming a very obtuse and much-rounded angle at its flexure, almost straight from thence to the border; discal transverse vein slightly curved inward in the middle, parted by much less than its length from the border, and by hardly less than its length from the flexure of the præbrachial; alulæ whitish cinereous; lower alulæ of the male dark cinereous. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

*Male, Var. β.* Golden-green; the four alulæ dark cinereous.

135. *MUSCA FORTUNATA*, n. s. (Gen. *Chrysomyia*, *Desv.*). *Mas.* Subaurato viridis, capite albo, palpis fulvis, antennis piceis, abdomine segmentorum marginibus posticis cyaneis, pedibus nigris, alis obscure cinereis basi nigricantibus, alulis albidis.

*Male.* Bright green, slightly gilded; head white; eyes not contiguous; frontalia black, narrow, linear; palpi tawny; antennæ piceous, nearly reaching the epistoma; abdomen not longer than the thorax, hind borders of the segments dark blue; legs black; wings dark grey, blackish at the base; veins black; præbrachial vein forming an obtuse and slightly-rounded angle at its flexure, almost straight from thence to its tip; discal transverse vein hardly undulating, parted by little more than half its length from the border, and by much more than half its length from the flexure of the præbrachial; alulæ whitish. Length of the body  $3-3\frac{1}{2}$  lines; of the wings 6-7 lines.

136. *MUSCA INTRAHENS*, n. s. (Gen. *Lucilia*, *Desv.*). *Fem.* Cyanescenti-viridis, capite albo, palpis antennis pedibusque nigris, alis cinereis, alulis obscure cinereis, halteribus testaceis.

*Female.* Bright bluish green; head white; frontalia dull black; palpi, antennæ, and legs black; abdomen not longer than the thorax; legs black; wings grey; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, straight from thence to its tip; discal transverse vein hardly bent inward, parted by more than half its length from the border, and by about its length from the flexure of the præbrachial; alulæ dark cinereous; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

This species very much resembles *M. electa*, but may be distinguished by its narrower body and by some slight differences in the veins of the wings.

137. *MUSCA OPTATA*, n. s. (Gen. *Pyrellia*, *Desv.*). *Mas.* Viridis, capite albido, palpis antennis pedibusque nigris, alis cinereis, alulis cinereis testaceo marginatis.

*Male.* Bright green; head whitish in front; palpi and antennæ black; abdomen a little broader and shorter than the thorax; legs black; wings cinereous; veins black; præbrachial vein forming a gentle curve at the flexure, straight from thence to the tip; discal transverse vein straight, parted by much more than half its length from the border,

and by about its length from the flexure of the præbrachial; alulae cinereous, with testaceous borders. Length of the body 3-3½ lines; of the wings 6-7 lines.

138. *MUSCA PROFERENS*, n. s. (Gen. *Pyrellia*, *Desv.*). *Mas.* Nigricanti-viridis, palpis antennis pedibusque nigris, alis cinereis, alulis obscure cinereis, halteribus apice pallidis.

*Male.* Blackish-green, shining; eyes contiguous; palpi and antennæ black, the latter nearly reaching the epistoma; abdomen a little broader and shorter than the thorax; legs black; wings cinereous; veins black; præbrachial vein forming a gentle curve at its flexure, straight from thence to its tip; discal transverse vein straight, parted by more than half its length from the border, and hardly more than its length from the flexure of the præbrachial; alulae dark cinereous; halteres with pale knobs. Length of the body 3 lines; of the wings 6 lines.

139. *Musca refixa*, *Walk.* See Vol. I. p. 26.

140. *MUSCA GAVISA*, n. s. (n. subg. *Neomyia*). *Fem.* Purpurea, pubescens, capite nigro, facie subobliqua, palpis antennis pedibusque nigris, abdomine lato crasso, alis fusciscenti-cinereis basi nigricantibus, alulis obscurioribus. *Var. β.* Viridescenti-cyanea, scutello purpureo.

*Female.* Brilliant purple; head black, shining, narrower than the thorax; frontalia dull, linear; face slightly oblique; palpi and antennæ black, the latter not reaching the epistoma; thorax and abdomen with thick black pubescence; abdomen very thick, shorter and much broader than the thorax; legs black; wings brownish grey, blackish at the base; veins black; præbrachial vein forming a much-rounded and very oblique curve at its flexure, hardly curved inward from thence to its tip; discal transverse vein hardly undulating, parted by much more than half its length from the border, and by much less than its length from the flexure of the præbrachial; alulae dark brownish grey. *Var. β.* Bright greenish blue; scutellum purple. Length of the body 5 lines; of the wings 10 lines.

141. *Musca domestica*, *Linn.* See Vol. I. p. 128.

142. *MUSCA CONDUCENS*, n. s. *Mas.* Cinerea, capite albo, palpis antennis pedibusque nigris, thorace vittis duabus latis nigris, abdomine testaceo linea dorsali nigra basi apiceque cinereo-nigris, alis cinereis.

*Male.* Cinereous; head white; eyes bare; palpi slender, subclavate; antennæ not reaching the epistoma; thorax with two broad black stripes; abdomen dull testaceous, cinereous black at the base and towards the tip, and with a black dorsal line; wings cinereous; veins black; præbrachial vein forming a rounded and very obtuse angle at its flexure, slightly curved inward from thence to its tip; discal transverse vein curved inward, parted by full half its length from the border, and by a little more than its length from the flexure of the præ-

brachial; alulae cinereous. Length of the body  $2\frac{1}{2}$  lines; of the wings  $4\frac{1}{2}$  lines.

143. *MUSCA XANTHOMELA*, n. s. *Fem.* Nigra, capite albido, abdomine ochraceo, alis subcinerascens, halteribus pallide testaceis.

*Female.* Black; head whitish about the eyes, which are red and bare; antennae not reaching the epistoma; abdomen ochraceous, a little shorter than the thorax; wings slightly greyish; veins black, testaceous towards the base; præbrachial vein forming an obtuse angle at the flexure, straight from thence to the border; discal transverse vein straight, parted by less than its length from the border, and by more than its length from the flexure of the præbrachial; halteres pale testaceous. Length of the body  $2\frac{1}{4}$  lines; of the wings 4 lines.

144. *MUSCA PRÆDICENS*, n. s. (Gen. *Graptomyza*, *Desv.*). *Fem.* Nigra, capite albido-cinereo, palpis antennis pedibusque nigris, thorace vittis quatuor albido-cinereis, abdomine testaceo maculis nigris, alis cinereis, halteribus testaceis.

*Female.* Black; head whitish cinereous; frontalia deep black, linear, with bristles along each side; facialia without bristles; epistoma not prominent; proboscis and palpi black; antennae reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four stripes, metathorax and pectus whitish cinereous; abdomen testaceous; four black spots on each segment excepting the 1st; legs black; wings cinereous; veins black, testaceous towards the base; præbrachial vein forming a curve at its flexure, which is very near the border; discal transverse vein almost straight, parted by little more than half its length from the border, and by more than its length from the flexure of the præbrachial; alulae and halteres testaceous. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

145. *MUSCA COLLECTA*, n. s. *Mas.* Viridis, cinereo tomentosa, capite albo antice testaceo, palpis antennisque fulvis, abdomine testaceo apice viridi linea dorsali nigra, pedibus nigris, tibiis obscure fulvis, alis cinereis, halteribus testaceis.

*Male.* Green, with cinereous tomentum; head white, testaceous and rather prominent in front; eyes bare, contiguous; epistoma slightly prominent; proboscis black; palpi tawny; antennae tawny, not near reaching the epistoma, 3rd joint not more than twice the length of the 2nd; arista simple, more than twice the length of the 3rd joint; abdomen testaceous, green towards the tip, with a black dorsal line; legs black; tibiae dark tawny; wings grey; veins black, testaceous towards the base; præbrachial vein forming a very obtuse and much-rounded angle at its flexure, from whence it is hardly curved inward to its tip; discal transverse vein curved outward, parted by much more than half its length from the border, and by hardly less than its length from the flexure of the præbrachial; alulae pale cinereous, with testaceous borders; halteres testaceous. Length of the body  $2\frac{3}{4}$  lines; of the wings 5 lines.

Subfam. ANTHOMYIDES, *Walk.*Gen. ARICIA, *Macq.*

146. *Aricia significans*, *Walk.* See Vol. III. p. 107.

147. *ARICIA CONTRARIA*, n. s. *Mas et Fæm.* Picca, capite argenteo, palpis pedibusque nigris, antennis testaceis, scutello fulvo, abdomine nigro, alis cinereis basi et apud costam subluridis.

*Male and Female.* Piceous, head silvery about the eyes; frontalia dull black; palpi and legs black; antennæ testaceous, reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four indistinct cinereous stripes; scutellum tawny; abdomen black, shining, a little broader but not longer than the thorax; wings grey, rather broad, with a lurid tinge towards the base and along the costa; veins black, tawny towards the base; discal transverse vein hardly undulating, or slightly curved inward, parted by much more than its length from the præbrachial, and by much less than its length from the border. Length of the body 3-4 lines; of the wings 6-8 lines.

148. *ARICIA INTEGRÆ*, n. s. *Mas.* Testaceo-cinerea, capite albo, palpis nigris, antennis testaceis basi nigris, thorace lineis quatuor nigris postice obsoletis, pedibus fulvis, tarsis piceis, alis cinereis apud costam subluridis, halteribus testaceis.

*Male.* Testaceous-cinereous; head white; frontalia deep black, widening in front; palpi black; antennæ testaceous, black at the base, nearly reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four black lines which are obsolete hindward; abdomen nearly oval, not longer than the thorax; legs tawny; tarsi piceous; wings grey, with a slight lurid tinge towards the costa; veins black; discal transverse vein curved inward towards the base, parted by about its length from the præbrachial transverse, and by much less than its length from the border; alulæ and halteres testaceous. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

149. *ARICIA NIGRICOSTA*, n. s. *Mas et Fæm.* Cinerea, capite argenteo, palpis nigris, antennis piceis, thorace vittis quatuor nigris, abdomine maculis quatuor nigris, pedibus fulvis, alis cinereis apud costam subluridis, costa nigra.

*Male and Female.* Cinereous; head silvery white; palpi black; antennæ piceous, tawny at the base, reaching the epistoma, 3rd joint about four times the length of the 2nd; thorax with four black stripes; abdomen nearly oval, not longer than the thorax, 2nd and 3rd segments with two black spots on each; legs tawny; tarsi black; wings cinereous, with a lurid tinge along the costa, which is black; veins black, tawny towards the base; discal transverse vein slightly bent inward, parted by about its length from the præbrachial transverse, and by much less than its length from the border. Length of the body 4 lines; of the wings 8 lines.



Gen. SPILOGASTER *Macq.*

150. SPILOGASTER XANTHOCERAS, n. s. *Fæm.* Alba, capite argenteo, palpis pedibusque nigris, antennis pallide testaceis basi nigris, thoracis fascia lata scutelloque nigris, thorace vitta fasciisque duabus nigris, alis cinereis apud costam subluvidis.

*Female.* White; head silvery white; frontalia broad, deep black; proboscis, palpi, and legs black; antennæ pale testaceous, reaching the epistoma, black at the base, 3rd joint about four times the length of the 2nd; thorax with a broad black band; scutellum black; abdomen cinereous, elongate, with a slender black stripe and with two black bands; wings cinereous, with a lurid tinge along the costa; veins black, tawny towards the base; discal transverse vein bent inward towards the base, parted by hardly more than its length from the præbrachial transverse, and by much less than its length from the border; alulæ white. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

Gen. ANTHOMYIA, *Meigen.*

151. Anthomyia procellaria, *Walk.* See Vol. III. p. 108.

Gen. LISPE, *Meigen.*

152. LISPE BIMACULATA, n. s. *Fæm.* Nigra, capite atro antice aurato subtus albido, pectore pedibusque cinereis, abdomine vitta cinerea maculis duabus subapicalibus albis, femoribus intermediis basi dilatatis, alis cinereis, halteribus testaceis.

*Female.* Black; head deep black above, gilded in front, whitish on each side beneath; pectus and legs cinereous; abdomen with a slender cinereous stripe, and with a white spot on each side near the tip; knees pale; middle femora dilated at the base; wings cinereous; veins black, tawny at the base; discal transverse vein parted by less than its length from the border, and by about twice its length from the præbrachial transverse; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

Gen. CÆNOSIA, *Meigen.*

153. CÆNOSIA LUTEICORNIS, *Walk.* (see Vol. III. p. 108). *Fæm.* Cana, capite aurato, frontalibus pedibusque fulvis, palpis albis, antennis pallide luteis, abdomine subtestaceo apice cano maculis quatuor nigris, alis cinerascens, halteribus testaceis.

This is probably the female of *C. luteicornis*, though the wings have no trace of an apical spot.

*Female.* Hoary; head pale gilded, hoary behind and beneath; frontalia tawny, widening slightly in front; palpi white; antennæ pale luteous, reaching the epistoma, 3rd joint linear, rounded at the tip, six times the length of the 2nd; arista plumose to full half its length; abdomen dull testaceous, hoary towards the tip, where it is very bristly

above, 3rd and 4th segments with a black dorsal spot on each, 4th and 5th segments with a black spot on each side; legs tawny; tarsi picous; wings greyish; veins black, testaceous at the base; discal transverse vein parted by a little less than its length from the border, and by much more than its length from the præbrachial transverse; alulae pale cinereous; halteres testaceous. Length of the body 3 lines; of the wings 6 lines.

154. *CÆNOSIA SIGNATA*, n. s. *Fam.* Cinereo-fulva, capite antennis pedibus halteribusque testaceis, thoracis vittis quatuor scutelli disco abdominisque vitta nigris, alis cinereis subluridis.

*Female.* Cinereous-tawny; head testaceous, white about the eyes; antennae testaceous, not near reaching the epistoma, 3rd joint elongate-conical, about twice the length of the 2nd; arista plumose to the tip; thorax with four black stripes, the outer pair interrupted; disk of the scutellum black; abdomen with a black stripe, which is interrupted on the hind border of each segment; legs testaceous; wings grey with a slight lurid tinge; veins tawny, costal vein black, discal transverse vein parted by little more than half its length from the border, and by about twice its length from the præbrachial transverse; halteres testaceous. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

155. *CÆNOSIA RESPONDENS*, n. s. *Fam.* Cana, capite apud oculos albo, palpis albidis, antennis halteribusque testaceis, thorace lineis tribus nigris, abdomine subfusiformi e maculis nigris trivittato, pedibus nigris, femoribus apice tibiisque fulvis, alis cinereis, alulis albis.

*Female.* Hoary; head white about the eyes; frontalia reddish; palpi whitish; antennae testaceous, 3rd joint long, slender, nearly reaching the epistoma; thorax with three black lines; abdomen nearly fusiform, a little longer than the thorax, with three black spots on each segment, legs black, femora towards the tips and tibiae tawny; wings grey; discal transverse vein parted by about twice its length from the præbrachial transverse, and by about its length from the border; alulae white; halteres testaceous. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

Subfam. HELOMYZIDES, *Fallen.*

Gen. XARNUTA, *Walk.*

156. *Xarnuta leucotelus*, *Walk.* See Vol. I. p. 28.

Gen. CORDYLURA, *Fallen.*

157. *CORDYLURA BISIGNATA*, n. s. *Mas.* Nigra, vix nitens, antennis breviusculis, arista pubescente, abdomine cylindrico maculis duabus lateralibus albis, pedibus non spinosis, alis obscure cinereis, alulis albis.

*Male.* Black, hardly shining; head white behind, testaceous towards the epistoma; antennae not near reaching the epistoma. 3rd joint

linear, rounded at the tip, full twice the length of the second; arista pubescent; abdomen cylindrical, a little longer than the thorax, with a white spot on each side in the middle; legs unarmed, moderately long; wings dark grey; veins black; discal transverse vein straight, upright, parted by a little less than its length from the border, and by full twice its length from the præbrachial transverse; alulæ white. Length of the body 2 lines; of the wings  $3\frac{1}{2}$  lines.

Gen. HELOMYZA, *Fallen.*

158. HELOMYZA OBSERVANS, n. s. *Mas.* Fulva, antennarum articulo 3<sup>o</sup> conico brevi, arista plumosa, abdomine guttis quatuor dorsalibus nonnullisque ventralibus nigris, segmentis albido marginatis, alis subcinereis.

*Male.* Tawny, with a few black bristles; antennæ short, 3rd joint conical, less than twice the length of the 2nd; arista plumose; abdomen conical, not longer than the thorax, hind borders of the segments whitish, fourth segment with a black dot, fifth segment with three black dots, some black dots along each side beneath; wings greyish; veins black, testaceous at the base; discal transverse vein straight, upright, parted by full half its length from the border, and by nearly twice its length from the præbrachial transverse. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

159. HELOMYZA TRIPUNCTIFERA, n. s. *Fæm.* Fulva, antennarum articulo 3<sup>o</sup> conico, arista plumosa, abdomine fasciis pallidis guttaque apicali atra, alis cinereis antice subluridis.

*Female.* Tawny, with black bristles; head whitish about the eyes; third joint of the antennæ conical, hardly twice the length of the 2nd; arista plumose to the tip; abdomen with a pale band on the hind border of each segment, and with a black apical dot; wings grey, with a lurid tinge in front; veins black; discal transverse vein straight, upright, clouded with brown, parted by less than its length from the border, and by more than twice its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

160. HELOMYZA COPIOSA, n. s. *Fæm.* Cinerea, capite vitta testacea, antennis fulvis brevissimis basi nigris, arista plumosa, thorace maculis plurimis fuscis, scutello fulvo basi nigro, abdomine nigro vitta et segmentorum marginibus posticis fulvis, tibiis fulvo einctis, alis cinereis nigricante maculatis.

*Female.* Cinereous; head slightly ferruginous, with a dull testaceous stripe on the front, whitish about the eyes; epistoma not prominent; antennæ tawny, black towards the base, very short, not extending beyond half the length of the face, 3rd joint conical, much longer than the 2nd; arista plumose; thorax with three rows of various brown spots; scutellum tawny, black at the base; pectus with brown spots; abdomen black, oval, not longer than the thorax, with a stripe

and the hind borders of the segments tawny: legs black, short; tibiæ tawny, black at the base and at the tips: wings grey, slightly lurid in front, with numerous partly confluent blackish spots; veins black; discal transverse vein straight, upright, parted by much less than its length from the border, and by about twice its length from the præbrachial transverse; halteres tawny. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

Gen. SCIOMYZA, *Fallen*.

161. SCIOMYZA REPLENA, n. s. *Fam.* Picea, capite ferrugineo lituris albis, antennis pedibus thoracisque vittis quatuor rufescentibus, abdomine nigro fasciis rufescentibus, femoribus nigris, tibiis nigro bifasciatis, alis nigricantibus albido trifasciatis margine postico cinereo.

*Female.* Piceous; head with several black bristles, white about the eyes, ferruginous above, with a white transverse line hindward, with a partly black partly white mark on each side, and with an abbreviated whitish streak in the middle; antennæ reddish, piceous towards the tips, 3rd joint conical, less than twice the length of the 2nd; arista plumose; thorax with four reddish stripes, the outer pair incomplete; abdomen black, with a reddish band on the fore border of each segment; legs reddish, femora black, tibiæ with two black bands; wings blackish, with three irregular abbreviated whitish bands, cinereous along the hind border; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by nearly twice its length from the præbrachial transverse; halteres testaceous. Length of the body  $2\frac{3}{4}$  lines; of the wings 5 lines.

162. SCIOMYZA? LEUCOMELANA, n. s. *Fam.* Picea, niteus, subtus alba, capite plano, antennis rufis apice nigris, arista plumosa, abdomine nigro, pedibus halteribusque testaceis, alis nigricantibus acutis.

*Female.* Piceous, shining; head flat above, a little narrower than the thorax; epistoma, sides of the peristoma, under side and disk of the pectus white; antennæ red, reaching the epistoma, third joint elongate-conical, black towards the tip; arista plumose; scutellum large; abdomen oval, black, hardly longer or broader than the thorax; legs short, testaceous; wings blackish, paler along the hind border, rather pointed at the tips; costa very convex; veins black, radial vein slightly curved, cubital vein and præbrachial vein converging towards the tip; discal transverse vein nearly straight and upright, parted by more than its length from the border, and by nearly twice its length from the præbrachial transverse; halteres testaceous. Length of the body 2 lines; of the wings 4 lines.

Gen. AMBLADA, n. g.

*Fam.* Corpus sat robustum. Caput transversum, thorace vix angustius. Antennæ capitis latitudine breviores; articulus 3<sup>us</sup> lanceolatus,

2° longior; arista pubescens. *Abdomen* brevi-ovatum, thorace multo brevius. *Pedes* simplices. *Alæ* medioeres.

*Female.* Body moderately stout. Head transverse, almost as broad as the thorax, somewhat flat above; proboscis and palpi very short. Antennæ shorter than the breadth of the head; 3rd joint lanceolate, longer than the 2nd; arista pubescent. Abdomen short-oval, much shorter than the thorax. Legs simple, moderately long. Wings of moderate size; veins of the usual structure.

163. *AMBLADA ATOMARIA*, n. s. *Fam.* Cinerca, capite guttis quatuor fuscis maculisque duabus atris, arista alba filiformi, thorace lineis duabus punctisque plurimis fuscis, abdomine fulvo segmentorum marginibus nigro punctatis, pedibus fulvis, tibiis albidis nigro bifasciatis, alis lurido-einereis.

*Female.* Cinereous; head white about the eyes, with two brown dots on each side of the vertex, and with a deep black spot on each side in front; antennæ cinereous-brown; arista white, filiform, seated on the base of the 3rd joint, which it much exceeds in length; thorax with two slender brown lines and with very numerous brown points; abdomen tawny, with black points on the hind borders of the segments; legs tawny; tibiæ dingy whitish, with two black bands on each; wings grey, with a lurid tinge; veins tawny, black by the costa at the base; discal transverse vein straight, upright, parted by less than its length from the border, and by full twice its length from the præbrachial transverse; halteres testaceous. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

Gen. *SEPEDON*, *Latr.*

164. *Sepedon Javanensis*, *Desv. Essai Myod.* 677. 2.  
Inhabits also Java.

Subfam. *LAUXANIDES*, *Walk.*

Gen. *LONCHÆA*, *Fallen.*

165. *LONCHÆA?* *PUNCTIPENNIS*. *Fam.* Nigra, nitens, capite antico argenteo, antennarum articulo 3<sub>o</sub> longe-conico, arista plumosa, tarsis halteribusque piceis, alis einereis basi nigris puncto costali nigro.

*Female.* Black, shining, with several stout bristles; head silvery in front; face flat; antennæ short; third joint elongate-conical, arista very plumose; abdomen oval, convex, a little shorter and narrower than the thorax; tarsi and halteres piceous; wings grey, black at the base, with a black costal point at the tip of the subcostal vein; veins yellowish, black at the base; costal vein black; discal transverse vein straight, upright, parted by less than its length from the border, and by nearly twice its length from the præbrachial transverse. Length of the body  $2\frac{1}{4}$  lines; of the wings  $4\frac{1}{2}$  lines.

166. *LONCHŒA*? *CONSENTANEA*, n. s. *Fam.* Nigra, nitens, arista nuda, abdomine cyanescente-nigro, alis cinereis, halteribus albis.

*Female.* Black, shining; antennæ black, nearly reaching the epistoma; 3rd joint linear, about thrice the length of the 2nd; arista simple; abdomen bluish black; wings grey; veins black, testaceous at the base; discal transverse vein straight, upright, parted by less than its length from the border and by more than twice its length from the præbrachial transverse; halteres white. Length of the body 2 lines; of the wings  $3\frac{1}{2}$  lines.

167. *LONCHŒA*? *ATRATULA*, n. s. *Fam.* Atra, pubescens, antennæ epistoma attingentibus, arista plumosa, abdomine subovato, alis nigricantibus.

*Female.* Deep black, pubescent, not shining; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista plumose; abdomen somewhat oval, a little broader but hardly longer than the thorax; wings blackish; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by about twice its length from the præbrachial transverse. Length of the body 2 lines; of the wings  $3\frac{1}{2}$  lines.

Gen. *THRESSA*, n. g.

*Fem.* Corpus breve, crassum. Caput thorace multo latius. Oculi magni. Antennæ epistoma fere attingentes; articulus 3<sup>us</sup> linearis, 2<sup>o</sup> plus duplo longior; arista plumosa. Abdomen subovatum, thorace non longius. Pedes longiusculi. Alæ parvæ.

*Female.* Body short, thick. Head much broader than the thorax; front wide. Eyes large. Antennæ nearly reaching the epistoma; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista plumose. Thorax a little longer than broad; scutellum rather prominent. Abdomen nearly oval, not longer than the thorax. Legs rather short. Wings small; costal vein ending at the tip of the wing; radial vein very near the costa; cubital vein ending at a little in front of the tip; transverse veins much retracted, very short.

168. *THRESSA* *SIGNIFERA*, n. s. *Fam.* Nigra, nitens, capite cyaneo, antennæ pedibusque fulvis, thorace strigis duabus lateralibus albis, femoribus nigris, alis hyalinis apud costam nigris, halteribus albis. *Var. β.* Alis apud costam hyalinis macula apicali nigra.

*Female.* Black, shining; head blue; antennæ tawny; thorax with a white transverse streak on each side; legs tawny; femora black, with tawny tips; wings hyaline, black along the costa; veins black; discal transverse vein parted by four times its length from the border, and by six times its length from the præbrachial transverse; halteres white. *Var. β.* Wings not black along the costa, with the exception of a black apical spot. Length of the body  $1\frac{1}{2}$  line; of the wings  $2\frac{1}{2}$  lines.

Gen. OCHTHIPHILA, *Fallen.*

169. OCHTHIPHILA DISCOGLAUCOA, n. s. *Fam.* Fusca, capite thoracisque disco glucescente-albidis, arista plumosa, thorace lineis duabus lateralibus albidis, abdomine lineis transversis vittaque albidis, tibiis tarsisque rufescentibus, alis cinereis, halteribus testaceis.

*Female.* Brown; head glaucous-whitish; antennæ black, nearly reaching the epistoma; third joint conical, arista plumose; thorax with a very broad glaucous-whitish stripe, a whitish line on each side and two on each side of the pectus; abdomen oval, a little shorter than the thorax, with a whitish band on the hind border of each segment and with a whitish stripe, the whitish hue appearing tawny in some aspects; tibiae and tarsi reddish; wings grey; veins black; discal transverse vein straight, upright, parted by much less than its length from the border, and by nearly twice its length from the præbrachial transverse; halteres testaceous. Length of the body 2 lines; of the wings 4 lines.

Gen. CELYPHUS, *Dalman.*

170. Celyphus obtectus, *Dalman.* See Vol. I. p. 30.

171. Celyphus sentatus, *Wied.* See Vol. I. p. 131.

Subfam. ORTALIDES, *Haliday.*Gen. LAMPROGASTER, *Macq.*

172. Lamprogaster marginifera, *Walk.* See Vol. II. p. 111.

Gen. PTEROGENIA *Bigot, MSS.*

*Mas et Fem.* *Platystomati* affinis. *Corpus* breve, latum, crassum. *Caput* thorace latius, antice planum, genis dilatatis. *Antennæ* parvæ; articulus 3<sup>us</sup> longi-conicus; arista plumosa. *Thorax* subconvexus; scutellum magnum. *Abdomen* thorace brevius et angustius. *Pedes* breves, validi; tibiæ arcuatæ. *Alæ* sat parvæ; alule maximæ. *Mas.* Genæ angulatæ, valde dilatatæ.

This genus is allied to *Platystoma*, and more especially to *Trigonosoma*.

*Male and Female.* Body short, broad, thick. Head broader than the thorax, flat in front; vertex broad; sides of the face or genæ dilated; epistoma rather prominent. Eyes oblong. Antennæ small, resting in the cavity of the broad face; 3rd joint elongate-conical, more than twice the length of the 2nd; arista plumose. Thorax compact, slightly convex; scutellum large, conical. Abdomen short, conical, shorter and narrower than the thorax. Legs short, stout; tibiæ curved, especially the hind pair. Wings rather small; alulæ very large. *Male.* Sides of the face more dilated than those of the female, and forming an angle or short horn on each side.

173. PTEROGENIA SINGULARIS, *Bigot, MSS.* *Mas et Fem.* Nigra, nitens, capite flavesciente-albo fasciis quatuor nigris, antennis pallide

luteis basi nigris, abdominis segmentis flavo marginatis, tarsis albis apice nigris, alis subcinereis dimidio basali lutescente fasciis contiguus fuscis, fascia strigisque exterioribus fuscis, halteribus fulvis.

*Male and Female.* Black, shining. Head yellowish-white, with four black bands; 1st band on the vertex, broader than the others; 2nd across the base of the antennæ; 3rd in front of the face; 4th on the epistoma; antennæ pale luteous, black at the base; hind borders of the abdominal segments yellow; sides dark tawny towards the base; legs pubescent; tarsi white, with black tips; wings slightly cinereous; basal half somewhat luteous, with several partly confluent brown bands, exterior part with one brown band and with several transverse brown streaks; veins black, pale luteous exteriorly; discal transverse vein slightly curved outward, parted by about one-third of its length from the border, and by more than its length from the præbrachial transverse; alulae white; halteres tawny. Length of the body 3 lines; of the wings 7 lines.

### Gen. PLATYSTOMA, Latr.

174. PLATYSTOMA ATOMARIUM, n. s. *Mas.* Cinereum, nigro pulverosum, facie alba nigro biguttata, antennis pedibusque nigris, arista plumosa, pectore albido, alis nigricantibus guttis plurimis limpidis.

*Male.* Cinereous; head flat above, white about the eyes; face white, with a black dot on each side in front; antennæ black, nearly extending to the peristoma; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista plumose; thorax with numerous lines of minute black points; pectus whitish, with black points; abdomen oval, powdered with black, not longer than the thorax; legs short, stout, black; wings blackish, covered with limpid dots, excepting a narrow oblique band on the transverse veins; veins black; discal transverse vein straight, upright, parted by less than half its length from the border, and by a little more than half its length from the præbrachial transverse. Length of the body  $2\frac{1}{2}$  lines; of the wings  $4\frac{1}{2}$  lines.

175. PLATYSTOMA BASALE, n. s. *Fæm.* Cinerea, capite lineis tribus albidis, antennis basi nigris, arista plumosa, thorace vittis indistinctis fuscis maculisque lateralibus nigris testaceo-marginatis, scutello nigro vitta cinerea, abdominis segmentis albido-marginatis, femoribus anticis tibiisque albido fasciatis, alis subcinereis lituris transversis fascia exteriori costam versus dilatata fasciæque subapicali nigricantibus, halteribus albis.

*Female.* Cinereous; head white about the eyes and beneath, and with three whitish lines on the front; epistoma not prominent; proboscis large; antennæ black towards the base, not near reaching the epistoma; 3rd joint elongate-conical, about twice the length of the 2nd; arista plumose; thorax with indistinct brown stripes, and on each side



with black shining testaceous-bordered spots; scutellum black, shining, with a cinereous stripe; abdomen cinereous-black, oval, tawny on each side at the base, a little shorter and narrower than the thorax; hind borders of the segments whitish; legs black; tibiae and fore femora with a whitish band on each; wings slightly greyish, with several irregular transverse blackish marks near the base, with a broad exterior blackish band, which is dilated and contains a whitish streak towards the costa, and with an irregular subapical blackish band; veins black; discal transverse vein nearly straight and upright, parted by more than half its length from the border, and by nearly twice its length from the præbrachial transverse; halteres white. Length of the body  $2\frac{1}{2}$  lines; of the wings  $4\frac{1}{2}$  lines.

Gen. DACUS, *Fabr.*

176. DACUS DIVERGENS, n. s. *Mas.* Purpureus, longus, angustus; fronte tumida, facie carinata fulvo maculata, palpis fulvis, antennis piceis, arista alba subpubescente, thorace vittis tribus cinereis, abdomine fusiformi apicem versus cylindrico et cyaneo, pedibus piceo-nigris, femoribus fulvis, tarsis posticis rufescentibus, alis cinereis apices versus et apud venas transversas fuscis, halteribus albido-flavis.

*Male.* Bluish purple, long, slender; head whitish about the eyes; front tumid, convex; face keeled, with a large elongated tawny spot; palpi tawny; antennæ piceous, reaching the epistoma, tawny at the base; 3rd joint linear, conical at the tip, six times the length of the 2nd; arista white, minutely pubescent, very much longer than the 3rd joint; thorax slightly compressed, with three cinereous stripes; pectus cinereous; abdomen fusiform, cylindrical, and mostly blue towards the tip, very much longer than the thorax; legs piceous black; femora tawny; hind tarsi reddish except at the tips; wings cinereous, brown on the fore part towards the tips and about the transverse veins, the brown part including a curved cinereous streak between the cubital and præbrachial veins; veins black; præbrachial vein very slightly undulating; discal transverse vein curved outward, parted by one-fourth of its length from the border, and by much more than its length from the oblique præbrachial transverse; halteres whitish yellow. Length of the body 7 lines; of the wings 12 lines.

The genus *Dacus* includes many distinct forms, and will probably be soon divided into numerous subgenera; the characters of the preceding species differ much from those of the type, *D. Oleæ*. Some of the following species may belong to *Senopterina*, Macq.

177. DACUS ADDENS, n. s. *Fam.* Cyaneus, longus, angustus, capite nigro, facie plana perobliqua, arista cinerea nuda, thorace vittis tribus cinereis, abdomine æneo-viridi, tibiis tarsis halteribusque nigris, alis cinereis apud costam et apud venam transversam discalcem nigricantibus.

*Female.* Blue, long, narrow; head black, depressed above, white about the eyes; face very oblique, forming before the front a protuberance on which the antennæ are seated, its fore part oblong quadrate, almost flat, with whitish furrows for the antennæ; palpi and antennæ black, the latter reaching the epistoma; 3rd joint linear, rather obtuse at the tip, six times the length of the 2nd; arista cinereous, bare, hardly longer than the 3rd joint; thorax with three indistinct cinereous stripes; abdomen æneous-green, nearly linear, slightly compressed, much longer than the thorax; oviduct protuberant, slender; legs short, stout; tibiæ and tarsi black; wings grey, blackish along the costa and about the transverse veins; veins and halteres black; discal transverse vein straight, upright, parted by full one-fourth of its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 6 lines; of the wings 12 lines.

178. *DACUS BILINEATUS*, n. s. *Fem.* Fulvus, longiusculus, nigro bivittatus, capite antennisque rufescentibus, arista plumosa, palpis porrectis; pedibus breviusculis nigro fasciatis, alis cinereis, costa venaque transversa discali fusco nebulosis, halteribus testaceis.

*Female.* Tawny, rather long; head reddish in front; epistoma rather prominent; palpi porrect; antennæ reddish, nearly reaching the epistoma; 3rd joint linear, rounded at the tip, about thrice the length of the 2nd; arista somewhat plumose; thorax elongate-elliptical, with two black stripes; abdomen lanceolate, shining, with two broad black stripes, longer than the thorax; legs rather short, with diffuse black bands; wings grey, brownish along the costa and about the discal transverse vein; veins black, tawny at the base; discal transverse vein nearly straight and upright, parted by one-fourth of its length from the border, and by much more than its length from the præbrachial transverse; halteres testaceous. Length of the body 4 lines; of the wings 7 lines.

179. *DACUS IMITANS*, n. s. *Fem.* Cyaneus, angustus, capite atro, antennis pedibusque nigris, tarsis posticis basi albidis, alis cinereis, costa vittaque nigris, halteribus piceis.

This species is closely allied to *D. longivitta*, and *D. exigens* and *D. contrahens* belong to the same group,

*Female.* Dark blue, narrow, with slight cinereous tomentum; head deep black above, white about the eyes; peristoma very prominent; proboscis large; antennæ black, nearly reaching the epistoma; 3rd joint linear, conical at the tip, about four times the length of the 2nd; arista bare, slender; abdomen fusiform, narrower and a little longer than the thorax; oviduct protuberant, slender; legs black, moderately long; first joint of the hind tarsi whitish above; wings cinereous, black along most of the costa to the tips, and black on the space between the cubital and præbrachial veins as far as the præbrachial transverse vein; discal transverse vein straight, upright, parted by

less than half its length from the border, and by very much more than its length from the præbrachial transverse; halteres piceous. Length of the body  $3\frac{1}{2}$  lines; of the wings 6 lines.

180. *DACUS EXIGENS*, n. s. *Mas.* Viridescente cyaneus, angustus, capite rufescente piceo, antennis luteis, arista nuda, thorace vittis tribus cinereis, pedibus fulvis, alis cinereis striga costali apiceque fuscis, halteribus testaceis.

*Male.* Greenish blue, narrow; head reddish, piceous above, white about the eyes, black in front; antennæ luteous, reaching the epistoma; 3rd joint slightly lanceolate, full four times the length of the 2nd; arista slender, simple; thorax with three cinereous stripes; abdomen almost cylindrical, much longer than the thorax; legs tawny; tarsi black towards the tips; wings grey, brown at the tips and with a brown streak on the middle of the costa; veins black, tawny towards the base; discal transverse vein straight, upright, clouded with brown, parted by less than half its length from the border, and by much more than its length from the præbrachial transverse; halteres testaceous. Length of the body  $3\frac{1}{4}$  lines; of the wings  $5\frac{1}{2}$  lines.

181. *DACUS CONTRAHENS*, n. s. *Fem.* Cyaneus, angustus, capite supra atro apud oculos albo, antennis luteis, thorace vittis tribus cinereis, pedibus piceis, alis cinereis vitta costali interrupta nigricante, vena transversa discali nigricante nebulosa, halteribus albidis.

*Female.* Dark blue, narrow; head deep black above, white about the eyes, piceous in front; antennæ luteous, reaching the epistoma; 3rd joint linear, conical at the tip, about six times the length of the 2nd; arista slender, simple; thorax with three cinereous stripes; abdomen compressed, a little longer than the thorax; legs piceous; wings grey, with a blackish interrupted costal stripe, which is dilated at the tip of the wing; veins black; discal transverse vein clouded with blackish, parted by half its length from the border, and by a little more than its length from the præbrachial transverse; halteres whitish. Length of the body 3 lines; of the wings 5 lines.

182. *DACUS INAPTUS*, n. s. *Mas et Fem.* Viridis, capite atro, facie fulva basi alba, antennis piceis, pedibus halteribusque nigris, alis angustis cinereis.

*Male and Female.* Green, with slight cinereous tomentum; head deep black, white about the eyes; face tawny, white at the base; antennæ piceous, reaching the epistoma; 3rd joint lanceolate, full four times the length of the 2nd; arista bare, long, slender; thorax long, slightly compressed; abdomen slightly compressed at the base, linear, narrower and a little shorter than the thorax in the male, fusiform and much attenuated towards the tip in the female; legs black, moderately long; wings narrow, cinereous; veins black, straight; discal transverse vein straight, upright, parted by less than half its length from the border, and by almost twice its length from the præbrachial trans-

verse; halteres black. Length of the body  $3\frac{1}{2}$ – $4\frac{1}{2}$  lines; of the wings 6–8 lines.

183. *DACUS TERMINIFER*, n. s. *Fæm.* Niger, nitens, breviusculus, capite rufescente, antennis fulvis, arista nuda, scutello pectorisque maculis duabus flavis, pedibus breviusculis, tibiis anterioribus femoribus posticis basi tarsisque albidis, alis vitreis, striga costali puncto apicali vittaque postica nigricantibus, halteribus testaceis.

*Female.* Black, shining, rather short; head reddish above; antennæ tawny, reaching the epistoma; 3rd joint linear, piceous towards the tip, which is rounded, about six times the length of the 2nd; arista slender, bare; scutellum dull yellow; pectus with an oblique yellow spot on each side; abdomen hardly broader than long, a little broader and shorter than the thorax; legs rather short; tarsi and anterior tibiæ whitish; hind femora whitish towards the base; wings vitreous, with a short black stripe extending from the base to near the hind border; costa with a blackish streak in the middle and with a blackish apical point; discal transverse vein straight, upright, parted by about one-third of its length from the border, and by more than its length from the præbrachial transverse, which is oblique and unusually long; halteres testaceous. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

184. *DACUS EMITTENS*, n. s. *Mas et Fæm.* Fulvus, facie brevi nigro biguttata, antennis pallide luteis, arista nuda, thorace lineis quinque rufescentibus, disco nonnunquam nigricante-cinereo, scutello callisque humeralibus flavis, abdomine nigro-fasciato, alis vitreis fusco plus minusve strigatis, halteribus albido-testaceis.

*Male and Female.* Tawny, convex, minutely pubescent; face short, with a black dot on each side; antennæ pale luteous, reaching the epistoma; 3rd joint linear, conical at the tip, full four times the length of the 2nd; arista slender, bare, much longer than the 3rd joint; thorax with five reddish lines; scutellum and humeral calli yellow; metathorax with a blackish mark on each side; abdomen short, oval, broader than the thorax, concave beneath, from whence in the female the lanceolate apical part proceeds; a protuberance on each side at the base, and a black middle band, behind which there is a slight longitudinal black line; wings vitreous, hrid and partly brown along the costa, brown along the subanal vein, and brown about the tips, excepting most of the space between the discal transverse vein and the border; veins tawny, partly black, slightly deviating; discal transverse vein nearly straight, parted by about one-third of its length from the border, and by more than its length from the oblique and rather long præbrachial transverse; halteres whitish testaceous. *Var. β.* Abdomen with two black bands. *Var. γ, Male.* Discal transverse vein not clouded with brown. *Var. δ, Male.* Præbrachial transverse vein clouded with brown. *Var. ε, Male.* Disk of the thorax blackish grey; wings vitreous, excepting a slight brown line along the costa,

and another along the subanal vein. *Var. ζ. Male.* Abdomen with a black interrupted subapical band. Length of the body 3-6 lines; of the wings 5-10 lines.

This species is closely allied to *D. ferrugineus* and to *D. tricittatus*, but may be distinguished by the luteous hue along the costa.

185. *DACUS DIFFUSUS*, n. s. *Fæm.* Testaceus, facie nigro fasciata, palpis nigro notatis, thoracis vittis duabus angustis abbreviatis et metathoracis fasciis duabus angustis nigris, abdomine fusiformi, alis subcinereis apud venas fusceseente subnebulosis.

*Female.* Testaceous, not shining; head paler about the eyes, with a black band on the face near the epistoma; palpi with a black mark on each outer side; antennæ reaching the epistoma; 3rd joint linear, rounded at the tip, more than four times the length of the 2nd; arista bare; thorax with two narrow abbreviated black stripes; metathorax with two slender black bands; abdomen fusiform, narrower and a little longer than the thorax; legs moderately long; wings slightly greyish, irregularly clouded with very pale brown about the veins; the latter black, testaceous towards the base; discal transverse vein straight, upright, parted by about one-fourth of its length from the border, and by much less than its length from the præbrachial transverse, which is undulating and very oblique. Length of the body 4 lines; of the wings 7 lines.

186. *DACUS FULVITARSIS*, n. s. *Fæm.* Niger, longiuseculus, capite apud oculos albo, antennis piceis, abdomine lanceolato, femoribus basi fulvis, metatarsis subdilatis, tarsis posterioribus fulvis, alis cinereis nigricante nebulosis, halteribus testaceis.

*Female.* Black, rather long and narrow; head white about the eyes; face small; antennæ piceous, short; 3rd joint nearly round, a little longer than broad; arista long, bare; thorax elongate; abdomen lanceolate, longer than the thorax; femora tawny at the base; metatarsi slightly dilated; posterior tarsi tawny, with black tips; wings grey, partly clouded with blackish; veins black; discal transverse vein straight, upright, parted by about twice its length from the border, and by about thrice its length from the præbrachial transverse; halteres testaceous. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

#### Gen. CALLANTRA, n. g.

*Fæm.* Corpus convexum. Caput thorace vix angustius. Palpi distincti, porrecti. Antennæ longæ, petiolo aut articulo 1<sup>o</sup> communi, arista nuda. Thorax brevis. Abdomen petiolatum, postice ovatum et valde convexum, subtus concavum. Pedes medioeres. Alæ sat angustæ.

*Female.* Body convex. Head almost as broad as the thorax; face vertical; palpi distinct, porrect; antennæ long, seated on a common petiole or first joint, with which the succeeding part forms a right angle; 3rd joint very slightly increasing in breadth from the base to

the tip, full thrice the length of the 2nd joint, which is rather long; arista bare, slender, a little longer than the 3rd joint. Thorax short. Abdomen petiolated, oval and very convex hindward, concave beneath, very much longer than the thorax. Legs moderately long. Wings rather narrow.

187. *CALLANTRA SMIEROIDES*, n. s. *Fæm.* Fulva, facie nigro-biguttata, antennis testaceis, thoracis fascia, scutello, callis duobus humeralibus, pectoris lituris duabus, abdominis fasciis duabus lituraque subapicali flavis, alis subcinereis apud costam fusciscentibus, halteribus testaceis.

*Female.* Tawny; head testaceous about the eyes; face with a black dot on each side; antennæ testaceous, extending beyond the epistoma; thorax with two yellow humeral calli, and with a yellow band which is continued on each side of the pectus, the latter having a yellow mark on each side hindward; scutellum yellow; abdomen with the hind borders of the 1st and 2nd segments yellow; a yellow capitate subapical mark, which is dilated on each side; wings slightly grey, brownish along the costa; veins black, tawny towards the base; a lurid tinge along the subanal vein; discal transverse vein oblique, nearly straight, parted by less than half its length from the border, and by more than its length from the præbrachial transverse; halteres testaceous. Length of the body  $4\frac{1}{2}$  lines; of the wings  $7\frac{1}{2}$  lines.

#### Gen. ARAGARA, n. g.

*Fæm.* *Corpus* angustum. *Caput* supra planum, thorace latius; facies valde retracta. *Antennæ* brevissimæ; articulus 3<sup>us</sup> subrotundus; arista nuda. *Thorax* longus, subcompressus. *Abdomen* ovatum, thorace brevius. *Pedes* antici raptorii, coxis longissimis, femoribus incrassatis. *Alæ* sat angustæ.

Allied to *Dacus*.

*Female.* Body narrow. Head flat above, broader than the thorax; face much retracted. Antennæ very short; 3rd joint nearly round, a little longer than the 2nd; arista bare, slender. Thorax long, slightly compressed. Abdomen oval, shorter but hardly broader than the thorax. Fore legs raptorious; coxæ very long; femora incrassated; tibiæ shorter than the femora to which they are applied. Posterior legs moderately long and stout. Wings rather narrow.

188. *ARAGARA CRASSIPES*, n. s. *Fæm.* Cinereo-nigra, capite cyaneo, tarsis testaceis, alis cinereis, halteribus albis.

*Female.* Black, slightly covered with cinereous tomentum; head blue, shining, luteous on each side in front; antennæ black; thorax cinereous on each side; tarsi testaceous, with black tips; wings grey; veins black; præbrachial vein and subanal vein very near each other from the base to the discal transverse vein, which is straight and parted

by four times its length from the border, and by more than four times its length from the præbrachial transverse; halteres white. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

Gen. ENICOPTERA, *Macq.*

189. ENICOPTERA PICTIPENNIS, n. s. *Mus.* Fulva, longa, nitens, pubescens, capite luteo vitta lata, litura antica arcuata maculisque duabus lateralibus nigris, palpis nigro notatis, antennis basi nigro guttatis apice nigricantibus, abdomine longi-fusiformi nigricante basi fulvo, alis longis luteis apud costam nigris postice cinereis, vittis quatuor deviis fuscis.

*Male.* Tawny, long, shining, pubescent, testaceous beneath; head pale luteous, with a broad black stripe, which is dilated on each side; a black U-shaped mark about the face, which is black; a large black spot on each side of the peristoma; palpi partly black; antennæ blackish at the tips, and with a black dot on each at the base; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista plumose; pectus with a minute blackish mark on each side in front; abdomen blackish, except towards the base, elongate-fusiform, much longer and narrower than the thorax; legs long, testaceous, minutely pubescent; wings long, luteous, cinereous along the inner part of the hind border; black along the exterior part of the costa, and with four irregular brown stripes which are abbreviated towards the base, the first also interrupted; veins luteous, black in the dark parts; radial vein undulating; cubital vein hardly undulating; præbrachial vein curved and inclined forward towards its tip; discal transverse vein very oblique, slightly curved outwards, parted by less than half its length from the border, and by more than its length from the præbrachial transverse. Length of the body 7 lines; of the wings 16 lines.

190. ENICOPTERA TORTUOSA, n. s. *Mus.* Fulva, longa, nitens, pubescens, facie argenteo bistrigata, thoracis vittis duabus fasciæque metathoracæ pectorisque disco nigris, abdomine lineari vittis duabus ventralibus nigris, alis longis vitreis subdilatatis, vitta costali fulva nigricante nebulosa, apice furcata, vittis duabus obliquis flavo-fuscis.

*Male.* Tawny, long, shining, minutely pubescent; head depressed above, with a silvery streak on each side of the face; antennæ reaching the epistoma; 3rd joint linear, slightly and obliquely truncated at the tip, full four times the length of the 2nd; arista plumose; thorax with an irregular black stripe along each side, and with a black band adjoining the scutellum; metathorax and disc of the pectus black; abdomen linear, much longer and narrower than the thorax, with a black stripe beneath; legs long, minutely pubescent; wings long, vitreous, somewhat dilated, tawny and partly shaded with blackish along the costa; this costal stripe dilated towards the base, and emitting a fork towards the tip; two oblique brown and yellow stripes,

which part from the hind border, are united on the præbrachial transverse vein, and there join the costal stripe, the exterior one very short; veins black; radial vein excessively contorted towards its tip; cubital vein straight till near its tip, where it is inclined hindward, and is slightly undulating; præbrachial vein very undulating exteriorly; subanal vein straight; discal transverse vein very oblique, nearly straight, parted by full one-fourth of its length from the border, and by full half its length from the præbrachial transverse, which is straight, upright, and unusually long. Length of the body 7 lines; of the wings 16 lines,

*Enicoptera flava*, Macq. (Dipt. Exot. Suppl. 3, 63), the type of this genus, inhabits Java, and is closely allied to *E. tortuosa*, and may be a local variety of the latter species, but differs from the character and figure. Macquart states that his description was taken from an apparently immature specimen.

191. *ENICOPTERA ARCUOSA*, n. s. *Mas.* Fulva, longa, nitens, pubescens, capite pallide luteo vitta lata biramosa fasciæque antica nigris, thoracis lineolis duabus maculisque duabus anterioribus pectorisque lituris duabus nigris, abdomine fusiformi, alis longis lutescentibus sat angustis apices versus fuscis postice cinereis, vitta discali albida, fascia exteriore alba antice furecata et arcuata.

*Male.* Tawny, long, shining, minutely pubescent; head pale luteous, with a broad black stripe which emits an oblique branch on each side to the eye, and with a black band by the epistoma; antennæ nearly reaching the epistoma; 3rd joint linear, rounded at the tip, thrice the length of the 2nd; arista plumose; thorax with two short black lines, each with a black spot in front; pectus with a black mark on each side; abdomen fusiform, longer but hardly narrower than the thorax; legs long, hardly pubescent; wings long, rather narrow, somewhat luteous, brown towards the tips, grey along the hind border, with a short whitish discal stripe which terminates in a white band, the latter abbreviated hindward and forked in front, the exterior fork much curved and terminating behind the tip of the wing; veins tawny, black towards the tips; radial vein slightly undulating opposite the præbrachial transverse vein; the other veins straight; discal transverse vein slightly oblique, slightly curved outward, parted by full one-third of its length from the border, and by nearly twice its length from the præbrachial transverse; halteres testaceous. Length of the body 6 lines; of the wings 14 lines.

192. *ENICOPTERA? PLAGIFERA*, n. s. *Fæm.* Testacea, longiuscula, frontis puncto nigro, facie nigricante-cinerea, palpis nigro guttatis, antennis luteis, thoracis lineis tribus strigisque duabus exterioribus, metathorace pectorisque lituris nigris, abdomine fusiformi fasciis duabus basalibus nigris; alis vitreis longiusculis, strigis duabus basalibus fasciis duabus plagaque subapicali fuscis.

*Female.* Testaceous, rather long, not shining, with a few black bristles;



head a little narrower than the thorax, with a black point on the front; face blackish grey; palpi with a black dot on each outer side; antennæ pale luteous, not reaching the epistoma; 3rd joint linear, rounded at the tip, about four times the length of the 2nd; arista bare; thorax with three black lines and with two short and more exterior black streaks; metathorax black, shining; pectus with some black marks on each side; abdomen fusiform, hardly longer than the thorax, with two black bands near the base; legs moderately long; wings vitreous, rather long, with two narrow brown bands, the interior band emitting two brown streaks to the base of the wing, the exterior band curved, continued along the costa to the tip of the radial vein, the space beyond it mostly occupied by an elliptical brown patch; veins black, straight; discal transverse vein straight, upright, parted by more than half its length from the border, and by nearly twice its length from the oblique præbrachial transverse. Length of the body  $4\frac{1}{2}$  lines; of the wings 9 lines.

Gen. ORTALIS, *Fallen.*

The two following species belong to a new group of *Ortalis*, and will probably form a distinct genus.

193. ORTALIS DECATOMOIDES, n. s. *Mas.* Obscure rufa, thorace brevi, abdomine nigro, fusiformi, basi rufo, pedibus fulvis, femoribus posterioribus basi albidis, tibiis posticis nigris, alis subcinereis, macula apicali fasciisque duabus nigricantibus.

*Male.* Dull red; head rather large, a little broader than the thorax, blackish on each side of the face; antennæ wanting; thorax short; abdomen black, shining, fusiform, red at the base, a little narrower but hardly longer than the thorax; legs tawny; posterior femora whitish at the base; hind tibiæ black; wings slightly greyish, rather convex along the hind border, blackish at the tips, and with two blackish bands; first band rather oblique; veins black; præbrachial vein and cubital vein slightly curved and approximating towards the tip of the wing; discal transverse vein straight, upright, short, parted by much more than its length from the border, and by full twice its length from the præbrachial transverse, which is extremely short; Length of the body  $1\frac{1}{4}$  line; of the wings  $2\frac{1}{2}$  lines.

194. ORTALIS VACILLANS, n. s. *Fem.* Fulva, arista pubescente, abdomine nigro postice lanceolato, alis limpidis, costa striga basali fasciisque tribus nigricantibus.

Closely allied to *D. decatomoides*. *Female.* Tawny, shining; head full as broad as the thorax; epistoma slightly prominent; antennæ nearly reaching the epistoma; 3rd joint linear, conical towards the tip, about four times the length of the 2nd; arista pubescent; abdomen black, a little longer than the thorax, lanceolate hindward; wings limpid, blackish along the costa, with a blackish streak, and with three slen-

der blackish bands: 1st band short, oblique, abbreviated hindward by the end of the basal streak; 2nd curved, slightly abbreviated hindward; 3rd nearly straight, entire; discal transverse vein upright, nearly straight, parted by less than half its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

Gen. TRYPETA, *Meigen*.

195. TRYPETA BASIFASCIA. *Fem.* Ferruginea, longiuscula, capite antennisque luteis, arista plumosa, metathorace nigro, pectoris disco nigricante, abdomine nigro basi fulvo, pedibus halteribusque fulvis, femoribus posterioribus nigricantibus, alis nigris albo notatis basi vitreis.

*Female.* Ferruginous, shining, rather long; head luteous, white about the eyes, narrower than the thorax; face rather long; sides of the peristoma slightly dilated; antennæ luteous, very short, not extending to half the length of the face; 3rd joint conical, much longer than the 2nd; arista plumose; metathorax black; disk of the pectus blackish; abdomen black, fusiform, tawny towards the base, a little longer than the thorax; legs and halteres tawny; posterior femora blackish; wings black, mostly vitreous towards the base, with two white spots on the costa, with two on the hind border, and with four or five transverse white dots on the disk; veins black, tawny at the base; discal transverse vein straight, upright, parted by much less than its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 4 lines; of the wings 7 lines.

196. TRYPETA NIGRIFASCIA, n. s. *Mas.* Fulva, capite antennisque pallide luteis, arista plumosa, thoracis lineis duabus et fascia metathoraceque nigris, abdomine elliptico, alis vitreis latiusculis, vitta costali fulva vittaque postica fusca.

*Male.* Tawny, shining; head pale luteous, whitish on the face and about the eyes; antennæ pale luteous, not near reaching the epistoma; 3rd joint elongate-conical, about twice the length of the 2nd; arista plumose; thorax with an irregular black line on each side, and with a black band in front of the scutellum; metathorax black; abdomen elliptical, much shorter and a little narrower than the thorax; wings vitreous, rather broad, with a broad tawny stripe, which occupies the whole base and extends beyond the tip along the costa, where it contains some grey marks; a brown stripe near the hind border, abruptly angular exteriorly; veins tawny; discal transverse nearly straight and upright, parted by less than half its length from the border, and by more than its length from the præbrachial transverse. Length of the body 3 lines; of the wings 6 lines.

197. TRYPETA LATIVENTRIS, n. s. *Mas.* Fusca, lata, depressa, capite, antennis, scutello abdomineque rufescentibus, arista subpubes-

cente, abdomine vitta interrupta nigra, pedibus testaceis, femoribus nigricantibus postice cinereis, lituris costalibus et marginalibus vitreis.

*Male.* Brown, rather broad and flat; head reddish, a little narrower than the thorax, testaceous on the face and about the eyes; face quite flat; antennæ reddish, not near reaching the epistoma; 3rd joint linear, rounded at the tip, more than twice the length of the 2nd; arista minutely pubescent; thorax with black bristles on each side; scutellum and abdomen dark reddish, the latter broader and not longer than the thorax, with a black stripe which is interrupted on the hind border of each segment; legs testaceous; femora blackish, testaceous towards the tips; wings blackish, rather broad, cinereous along the basal part of the hind border, with two small vitreous marks towards the tip of the costa, and with three vitreous marks hindward, the middle one much larger than the other two; veins black; discal transverse vein nearly straight and upright, parted by a little less than half its length from the border, and by a little less than its length from the præbrachial transverse; alulæ and halteres testaceous. Length of the body  $3\frac{1}{2}$  lines; of the wings 5 lines.

198. *TRYPETA STELLIPENNIS*, n. s. *Mas et Fæm.* Ferruginea, capite antennisque pallide luteis, arista plumosa, metathorace nigricante, abdomine fusiformi, pedibus halteribusque testaceis, alis nigricantibus latiusculis, guttis marginalibus punctisque discalibus albis.

*Male and Female.* Ferruginous, paler beneath; head pale luteous, not so broad as the thorax; epistoma not prominent; antennæ pale luteous, not near reaching the epistoma; 3rd joint linear, rounded at the tip, full twice the length of the 2nd; arista plumose; metathorax blackish; abdomen fusiform, narrower and a little longer than the thorax; oviduct of the female cylindric-lanceolate; legs and halteres testaceous; wings blackish, rather broad, white at the tips, with white marginal dots and with white discal points; veins black; discal transverse vein upright, nearly straight, parted by a little more than one-fourth of its length from the border, and by about its length from the præbrachial transverse, which is rather long. Length of the body  $2\frac{1}{2}$ – $3\frac{1}{2}$  lines; of the wings 5–6 lines.

199. *TRYPETA AMPLIPIENNIS*, n. s. *Fæm.* Cinerea, capite antennis pedibus halteribusque fulvis, arista nuda, abdomine nigro fusiformi basi fulvo apicem versus lanceolato, alis nigris latissimis albo guttatis.

*Female.* Cinereous, dull; head tawny, whitish about the eyes; face flat; antennæ tawny, very short, not extending beyond half the length of the face; 3rd joint conical, a little longer than the 2nd; arista bare; abdomen fusiform, black, shining, tawny towards the base, lanceolate towards the tip, a little narrower and much longer than the thorax; legs and halteres tawny; wings black, very broad, with a white apical spot, with some white marginal and discal dots, and with two larger white transverse costal marks; veins black, tawny at the

base; discal transverse vein straight, upright, parted by about half its length from the border, and by a little less than its length from the præbrachial transverse. Length of the body 3 lines; of the wings 6 lines.

200. *TRYPETA APPROXIMANS*, n. s. *Fam.* Nigra, nitens, capite rufescente, facie cinerea, abdomine elliptico apicem versus lanceolato, pedibus fulvis, femoribus nigris, alis nigricantibus albo maculatis.

*Female.* Black, shining; head reddish; face cinereous; abdomen elliptical, lanceolate towards the tip, much longer than the thorax; legs tawny; femora black; wings blackish, with two white triangular spots on the costa, with three white dots on the disk, with three white streaks on the hind border, and with two white subapical streaks; veins black; discal transverse vein nearly straight and upright, parted by much less than its length from the border, and by a little less than its length from the præbrachial transverse. Length of the body  $1\frac{1}{4}$  line; of the wings  $2\frac{1}{2}$  lines.

Gen. *SOPHIRA*, *Walk.*

201. *SOPHIRA BISTRIGA*, n. s. *Fam.* Fulva, capite luteo, arista plumosa, thorace pectoreque nigro maculatis, metathorace vittis duabus nigris, abdomine fusiformi maculis lateralibus nigris, oviductu lanceolato, alis nigricantibus albo bifasciatis basi fulvis.

*Female.* Tawny, shining; head luteous, hardly as broad as the thorax, white about the eyes; antennæ tawny, not near reaching the epistoma; 3rd joint elongate-conical, more than twice the length of the 2nd; arista plumose; thorax with four large black spots; metathorax with two black stripes; pectus with two elongated black spots on each side; abdomen fusiform, with a long lanceolate flat oviduct, much longer than the thorax; each segment with two large lateral black spots; wings blackish, tawny towards the base, with two white bands, the exterior band curved outward in front, and not extending to the costa; veins black, tawny towards the base; discal transverse vein curved outward, parted by full one-fourth of its length from the border, and by very much more than its length from the præbrachial transverse. Length of the body  $4\frac{1}{2}$  lines; of the wings 8 lines.

Gen. *PALLOPTERA*, *Fallen.*

202. *PALLOPTERA DETRACTA*, n. s. *Mas.* Testacea, capite apud oculos cinereo, arista subpubescente, abdomine guttis duabus lateralibus subapicalibus nigris, alis cinereis.

*Male.* Testaceous; head pale cinereous behind and about the eyes; antennæ short, tawny; arista very minutely pubescent; abdomen oval, not longer than the thorax, with a black dot on each side of the subapical segment; wings grey; veins black, testaceous at the base;

discal transverse vein straight, upright, parted by hardly half its length from the præbrachial transverse. Length of the body  $2\frac{1}{2}$  lines; of the wings 5 lines.

Subfam. DIOPSIDES, *Walk.*

Gen. DIOPSIS, *Linn.*

203. *Diopsis subnotata*, *Westw. Orient. Ent.* pl. 18. f. 2.

Inhabits also the Philippine Islands.

204. *DIOPSIS DETRAHENS*, n. s. *Fæm.* Nigra, capite ex parte ferrugineo, oculorum petiolis breviusculis, abdomine subtus lurido, coxis femoribusque fulvis, his apice nigris, alis nigricantibus macula subcostali alba.

*Female.* Black; head partly ferruginous; petioles of the eyes each equal in length to the space between them; abdomen lurid beneath; coxæ and femora tawny, the latter with black tips; wings blackish, with a white subcostal spot towards the tip; veins black; halteres piceous. Length of the body  $2\frac{1}{2}$  lines; of the wings 4 lines.

Subfam. SEPSIDES, *Walk.*

Gen. CALOBATA, *Fabr.*

205. *CALOBATA RESOLUTA*, n. s. *Mas.* Nigra, abdomine lineari longo, segmentis albido marginatis, pedibus longissimis, femoribus posterioribus testaceo trifasciatis, femoribus anticis basi coxisque anticis testaceis, tarsis anticis albis, alis cinereis apices versus obscurioribus fascia subapicali albida.

*Male.* Black, slightly shining; pectus with an oblique cinereous band on each side; abdomen linear, pale beneath, much narrower than the thorax, and nearly twice its length, hind borders of the segments whitish; legs black, very long; posterior femora with three testaceous bands; fore femora at the base, and fore coxæ, testaceous; fore tarsi white; wings dark grey, blackish grey on each side of a whitish subapical band; veins black: discal transverse vein straight, upright, parted by about half its length from the border, and by more than four times its length from the præbrachial transverse; halteres piceous. Length of the body 6 lines; of the wings 10 lines.

206. *CALOBATA IMPINGENS*, n. s. *Mas et Fæm.* Obscure cyanea, antennis rufis, abdomine subtus ferrugineo segmentis albo marginatis, pedibus fulvis, femoribus tibiisque anticis nigris, illis basi fulvis, femoribus posterioribus nigro trifasciatis, tibiis tarsisque posterioribus obscure fulvis, tarsis anticis albis basi nigris, alis cinereis fusco bifasciatis.

*Male and Female.* Dark blue; head white about the eyes; antennæ red; abdomen lanceolate, ferruginous beneath, narrower and very

much longer than the thorax, hind borders of the segments white; legs tawny, very long; posterior coxæ and fore tibiæ black; posterior femora with three black bands; fore femora black, tawny towards the base; posterior tibiæ and posterior tarsi dark tawny; fore tarsi white, black at the base; wings grey, with two brown bands, the second apical; veins black; cubital vein and præbrachial vein converging to the tip of the wing; discal transverse vein straight, upright, parted by much less than its length from the border, and by more than thrice its length from the præbrachial transverse. *Var. β*: Bands of the wings broader and more complete. Length of the body 4-5 lines; of the wings 7-8 lines.

This species is erroneously recorded as *C. indica* in Vol. III. p. 124.

207. *CALOBATA BIFASCIATA*, n. s. *Fæm.* Nigra, longissima, gracillima, capite litura transversa albida, arista breviuscula basi robusta, abdominis dimidio antico subclavato fasciis duabus cinereis, dimidio postico lanceolato, femoribus posticis basi albidis apice rufescentibus, tarsis anticis albis apice nigris, alis cinereis nigricante bifasciatis.

*Female.* Black, very long and slender; head with a whitish transverse mark in front of the face, which is very short; 3rd joint of the antennæ elongate-conical, more than twice the length of the 2nd; arista rather short, stout towards the base; thorax attenuated in front; abdomen more than twice the length of the thorax, broadest in the middle, subclavate to half its length, lanceolate from thence to the tip, two cinereous bands on the basal half; legs long; hind femora whitish at the base, reddish at the tips; fore tarsi white, with black tips; wings grey, slightly blackish at the tips, and with two blackish bands, the second broader and more complete than the first; veins black; cubital vein and præbrachial vein slightly converging towards the tip of the wing; discal transverse vein straight, oblique, parted by less than its length from the border, and by more than thrice its length from the præbrachial transverse. Length of the body 5 lines; of the wings 8 lines.

Gen. *CARDIACEPHALA*, *Macq.*

208. *CARDIACEPHALA VARIPES*, n. s. *Mas.* Testacea, gracillima, capite subelongato, antennis pallide rufis basi nigris, thorace antico attenuato, abdomine lineari apicem versus tumido, femoribus intermediis subincrassatis, tibiis intermediis nigris, tarsis intermediis albis apice nigris, alis pallide fusciscentibus, basi fasciaque cinerascenscentibus.

*Male.* Testaceous, very slender; head somewhat elongated; antennæ pale red, black at the base; thorax long, attenuated in front; abdomen linear, tumid towards the tip, narrower and much longer than the thorax; legs very long; fore legs much shorter and more slender than the others; middle femora slightly incrassated, except towards the tips; middle tibiæ black; middle tarsi white, with black tips; wings

pale brownish, greyish towards the base and with a greyish band beyond the discal transverse vein; veins black, testaceous towards the base; cubital vein and præbrachial vein slightly converging towards the tip of the wing; discal transverse vein straight, upright, parted by less than its length from the border, and by about thrice its length from the præbrachial transverse. Length of the body  $3\frac{1}{2}$  lines; of the wings 6 lines.

Gen. SEPSIS, *Fallen.*

209. SEPSIS TESTACEA, n. s. *Mas et Fæm.* Testacea aut fulva, antennis pallide rufis, abdomine subpubescente, alis cinerascens, costa basali nigra. *Var. β.* Abdomine piceo basi fulvo.

*Male and Female.* Testaceous or tawny, slightly setose; antennæ pale red, 3rd joint conical, about twice the length of the 2nd; abdomen slightly pubescent; wings greyish, black along the costa towards the base; veins black; discal transverse vein straight, upright, parted by a little more than its length from the border, and by more than its length from the præbrachial transverse. *Var. β:* Abdomen piceous, tawny towards the base. Length of the body 2-3 lines; of the wings 3-4 lines.

210. SEPSIS FRONTALIS, n. s. *Mas.* Nigra, capite antico, antennis, pedibus anticis femoribusque posterioribus basi testaceis, alis vitreis. *Fæm.* Fulva, abdomine nigro.

*Male.* Black, shining; head in front and antennæ testaceous; fore legs testaceous; posterior femora testaceous towards the base; wings vitreous; veins black; discal transverse vein straight, oblique, parted by twice its length from the border, and from the præbrachial transverse. *Female.* Tawny; abdomen black. Length of the body 1 line; of the wings 2 lines.

211. SEPSIS FASCIPES, n. s. *Fæm.* Nigra, subnitens, antennis pallide rufis, abdomine fusiformi postice attenuato, pedibus albis, tibiis intermediis femoribusque nigris, tibiis posticis basi apiceque nigris, alis cineris macula apicali nigra.

*Female.* Black, slightly shining; antennæ pale red, very short, 3rd joint conical; abdomen fusiform, lanceolate and much attenuated towards the tip, much longer than the thorax; legs white; femora and middle tibiæ black; hind tibiæ black at the base and at the tips; wings grey, with a black spot at the tip of the costa; veins black; discal transverse vein straight, upright, parted by its length from the border, and by full twice its length from the præbrachial transverse. Length of the body  $\frac{3}{4}$  line; of the wings 3 lines.

212. SEPSIS REVOCANS, n. s. *Fæm.* Cupreo-nigra, antennis nigris, pedibus balteribusque testaceis, alis subcinerascens basi nigricantibus.

*Female.* Cupreous-black, shining; antennæ black, very short; legs

testaceous ; wings slightly greyish, blackish at the base of the costa ; veins black ; discal transverse vein straight, upright, parted by more than twice its length from the border, and by less than twice its length from the præbrachial transverse ; halteres testaceous. Length of the body  $1\frac{1}{2}$  line ; of the wings 2 lines.

Subfam. PSILIDES, *Walk.*

Gen. MICROPEZA, *Macq.*

213. *Micropeza fragilis*, *Walk.* See Vol. I. p. 37.

Gen. CÆNURGIA, n. g.

*Mas.* *Corpus* gracile. *Caput* elongatum, antice conicum. *Antennæ* porrectæ ; articulus 3<sup>us</sup> lanceolatus ; arista apicalis, sat robusta. *Thorax* linearis. *Abdomen* fusiforme, thorace vix angustius, non longius. *Pedes* longi ; femora lata, compressa ; tarsi antichi articulo 1<sup>o</sup> dilatato fusiformi. *Alæ* breviusculæ, sat angustæ.

Allied to *Nerius*. *Male*. Body slender. Head elongate, conical in front, as broad as the thorax. *Antennæ* porrect ; 1st and 2nd joints short ; 3rd lanceolate ; arista rather stout, apical, larger than all the preceding joints. *Thorax* linear. *Abdomen* fusiform, hardly narrower and not longer than the thorax. *Legs* long, femora broad, compressed ; fore tarsi with the first joint dilated, fusiform. *Wings* rather short and narrow.

214. CÆNURGIA REMIPES, n. s. *Mas.* Fulva, capite guttis tribus nigris, antennis basi nigris, arista alba, thorace maculis duabus nigris, pedibus nigris, coxis femoribusque luteis apice nigris, alis flavo-cinereis, halteribus apice nigris.

*Male*. Tawny ; head with a black spot on the vertex, and with two black dots on each side, one in front, the other behind ; antennæ black towards the base ; arista white ; thorax with a black spot on each side in front ; legs black ; coxæ and femora luteous, with black tips ; wings grey, tinged with yellow ; veins black ; cubital vein and præbrachial vein converging towards the tip of the wing ; discal transverse vein straight, oblique, parted by less than its length from the border, and by more than twice its length from the præbrachial transverse ; halteres with black knobs. Length of the body  $3\frac{1}{2}$  lines ; of the wings  $5\frac{1}{2}$  lines.

Gen. NERIUS, *Wied.*

215. *Nerius fuscipennis*, *Macq.* See Vol. I. p. 38.

Gen. SERACA, n. g.

*Fæm.* *Corpus* longiusculum. *Caput* transversum, thorace vix angustius. *Antennæ* breves, articulo 3<sup>o</sup> conico, arista plumosa. *Thorax* ellip-



ticus. *Abdomen* ellipticum. *Pedes* mediocres. *Alæ* longiusculæ, latiusculæ.

*Female.* Body rather long. Head transverse, nearly as broad as the thorax; epistoma not prominent. Antennæ short, not near reaching the epistoma; 3rd joint conical, much longer than the 2nd; arista plumose. Thorax and abdomen elliptical, about equal in length. Legs moderately long and slender. Wings rather long and broad.

216. *SERACA SIGNIFERA*, n. s. *Fæm.* Fulva, thorace vittis quatuor metathorace vittis duabus abdomine maculis lateralibus nigris, alis obscure fuscis albo quinquesignatis apud costam nigricantibus basi flavis.

*Female.* Tawny, shining; head testaceous about the eyes; thorax with four black stripes, the outer pair incomplete; metathorax with two black stripes; abdomen with a row of black spots along each side; wings dark brown, blackish along the costa, yellow at the base, with five lanceolate white marks, two of these resting on the costa, the third between them near the hind border, the fourth exterior, discal, slender, oblique, the fifth on the hind border near the tip; veins black, tawny at the base; discal transverse vein curved outward, parted by about one-fourth of its length from the border, and by much more than its length from the præbrachial transverse. Length of the body 4 lines; of the wings 8 lines.

217. *SERACA SIGNATA*, n. s. *Fæm.* Testacea, longiuscula, epistomate guttis duabus nigris, arista plumosa, abdomine postice attenuato maculis duabus lateralibus subapicalibus, alis cinerascens, costa exteriore nigricante.

*Female.* Testaceous, shining, rather long; head nearly as broad as the thorax, with a black dot on each side of the epistoma; antennæ short, 3rd joint elongate-conical, arista plumose; thorax elliptical; abdomen attenuated hindward, longer than the thorax, with a black spot on each side of the 5th segment; wings greyish, blackish along the apical half of the costa; veins testaceous, black towards the tips; discal transverse vein nearly straight and upright, parted by about one-fourth of its length from the border, and by hardly more than its length from the præbrachial transverse. Length of the body  $3\frac{1}{2}$  lines; of the wings 7 lines.

#### Gen. *PSILA*, *Meigen*.

218. *PSILA BIPUNCTIFERA*, n. s. *Fæm.* Testacea, facie nigro bipunctata, antennarum articulo 3<sup>o</sup> longiconico, arista pubescente, abdomine guttis duabus apicalibus nigris, alis pallide cinereis flavo suffusis.

*Female.* Testaceous; head somewhat pilose beneath, with a black point on each side of the face; 3rd joint of the antennæ elongate-conical, about twice the length of the 2nd; arista pubescent; thorax elongate, somewhat flat above; abdomen fusiform, a little longer than the thorax;

5th segment with a black dot on each side; wings pale cinereous, tinged with yellow; veins yellow; discal transverse vein straight, oblique, parted by hardly more than one-fourth of its length from the border, and by more than its length from the præbrachial transverse. Length of the body 5 lines; of the wings 10 lines.

219. *PSILA MUNDA*, n. s. *Mas et Fæm.* Nigra, nitens, facie testacea nigro notata, antennis testaceis basi nigris, arista plumosa, thorace subcinerascens, scutello obscure testaceo, pedibus testaceis, alis cinereis apud costam nigricantibus, halteribus albidis.

*Male and Female.* Black, shining; head testaceous, blackish above; disk of the face black, shining: antennæ short, testaceous, black at the base; 3rd joint linear, rounded at the tip, about twice the length of the 2nd; arista plumose: thorax linear, with slight cinereous tomentum; scutellum dull testaceous; abdomen fusiform, a little longer than the thorax; legs testaceous; wings grey, blackish along the costa towards the tips; veins black; discal transverse vein straight, upright, parted by about half its length from the border, and by nearly thrice its length from the præbrachial transverse; halteres whitish. Length of the body  $2\frac{1}{2}$ –3 lines; of the wings 4–5 lines.

#### Gen. *TEXARA*, *Walk.*

220. *TEXARA DIOCTRIOIDES*, n. s. *Mas et Fæm.* Nigra, longa, gracilis, capite nigro-cyaneo, thorace vittis quatuor cinereis, segmentorum abdominalium lateribus albo marginatis, pedibus fulvo fasciatis, alis cinereis, halteribus testaceis.

*Male and Female.* Black, long, slender; head bluish-black, white about the eyes in front; antennæ of the male piceous, of the female tawny, 3rd joint round, arista minutely pubescent; thorax with four cinereous stripes; abdomen about twice the length of the thorax, cylindrical towards the base, subclavate in the male and elongate-fusiform in the female hindward: hind borders of the segments white on each side; fore femora, hind tibiæ and hind tarsi tawny at the base; middle legs and hind femora tawny, the latter with a broad black band; fore tibiæ white, black at the base; wings grey; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by almost four times its length from the præbrachial transverse; halteres testaceous. Length of the body 4–4½ lines; of the wings 6–7 lines.

#### Gen. *GOBRYA*, n. g.

*Mas.* *Corpus* gracillimum. *Caput* thorace multo latius; frons sat angusta; facies plana. *Oculi* magni. *Antennæ* brevissimæ; articulus 3<sup>us</sup> conicus; arista pubescens. *Thorax* sat parvus. *Abdomen* cylindricum, gracillimum, apice clavatum, thorace duplo longius. *Pedes* graciles; anteriores breves; postici longiusculi. *Alæ* perangustæ.

*Male.* Body very slender. Head much broader than the thorax; front rather narrow; face vertical, flat; eyes large, prominent. Antennæ very short; 3rd joint conical, longer than the 2nd; arista pubescent. Thorax rather small. Abdomen clavate, about twice the length of the thorax, cylindrical and very slender till near its tip. Legs slender; anterior legs short; hind legs rather long. Wings very narrow; discal transverse vein straight, upright, parted by more than its length from the border, and by more than four times its length from the præbrachial transverse.

221. *GOBRYA BACCHOIDES*, n. s. *Mas.* Cyanea, nitens, antennis pedibusque pallide flavis, abdomine nigro fasciis duabus flavis, femoribus posterioribus tibiisque posticis nigris, tarsis posticis basi nigris, alis vix cinerascens, halteribus flavis apice nigris.

*Male.* Blue, shining; proboscis, antennæ, and legs pale yellow; abdomen black, with two pale yellow bands, the hind one very slender; posterior femora and hind tibiæ black, the former pale yellow at both ends; middle tibiæ and tarsi wanting; hind tarsi black towards the base; wings hardly greyish, apical third part brown; veins black; halteres pale yellow, with black knobs. Length of the body  $2\frac{3}{4}$  lines; of the wings 4 lines.

Subfam. OSCINIDES, *Haliday*.

Gen. OSCINIS, *Fabr.*

222. *OSCINIS FEMORATA*, n. s. *Mas.* Atra, nitens, capite nigro-cyaneo, femoribus anterioribus basi, tibiis anterioribus apice, tarsis halteribusque flavis, femoribus posticis incrassatis, alis cinerascens.

*Male.* Deep black, shining; head bluish-black; abdomen conical, shorter than the thorax; legs black; anterior femora at the base, anterior tibiæ at the tips, and tarsi yellow; hind femora incrassated; wings greyish; veins black; discal transverse vein straight, upright, parted by more than its length from the border, and by much more than its length from the præbrachial transverse; halteres yellow. Length of the body  $1\frac{1}{4}$  line; of the wings 2 lines.

Gen. PIOPHILA, *Fallen.*

223. *PIOPHILA CONTECTA*, n. s. *Fam.* Nigra, nitens, oviductu lanceolato, pedibus halteribusque fulvis, pedibus anticis nigris, femoribus basi fulvis, alis cinereis.

*Female.* Black, shining; oviduct prominent, lanceolate; legs and halteres tawny; fore legs black; coxæ, femora at the base and knees tawny; wings grey; veins black; discal transverse vein straight, upright, parted by less than its length from the border, and by more than its length from the præbrachial transverse. Length of the body 2 lines; of the wings 4 lines.

Gen. OPOMYZA, *Fallen.*

224. *OPOMYZA NIGRIFINIS*, n. s. *Fæm.* Cinerea, capite antennisque pallide rufis, arista plumosa, thorace bilineato, pectore halteribusque albis, abdomine fulvo lanceolato apicem versus nigro, pedibus fulvis, alis nigris albo guttatis.

*Female.* Cinereous; head pale red, white beneath; antennæ pale red, very short, 3rd joint nearly round, arista plumose; thorax with two indistinct darker lines; pectus and halteres white; abdomen lanceolate, tawny, shining, black towards the tip; legs tawny; wings black, rather narrow, with about ten white dots, of which two are larger than the others, and form a broken and almost interrupted band near the base; veins black; discal transverse vein straight, upright, parted by about half its length from the border; no præbrachial transverse vein. Length of the body  $1\frac{1}{4}$ – $1\frac{1}{2}$  lines; of the wings  $2\frac{1}{2}$ –3 lines.

Gen. DROSOPHILA, *Fallen.*

225. *DROSOPHILA SOLENNIS*, n. s. *Mas.* Testacea, facie carinata, thorace vittis quatuor fulvis, abdomine fasciis abbreviatis nigricantibus, alis cinereis.

*Male.* Testaceous; face keeled; antennæ wanting; thorax with four tawny stripes; abdomen elliptical, a little longer than the thorax, with blackish abbreviated bands; wings grey; veins black; discal transverse vein straight, upright, parted by hardly less than its length from the border, and by about thrice its length from the præbrachial transverse. Length of the body  $1\frac{1}{2}$  line; of the wings 3 lines.

226. *DROSOPHILA RUDIS*, n. s. *Mas.* Fulva, facie albidâ, abdomine nigro nitente basi fulvo, pedibus halteribusque testaceis, alis cinereis apud costam obscurioribus maculis quatuor nigricantibus.

*Male.* Tawny, testaceous beneath; face whitish; antennæ wanting; abdomen elongate-oval, black, shining, tawny at the base, not longer than the thorax; legs and halteres testaceous; wings grey, darker along the costa, with four blackish spots, first spot subcostal, larger than the second which is discal, third apical, band between the second and third spots irregular, attenuated hindward; veins black; discal transverse vein straight, upright, parted by nearly its length from the border, and by nearly twice its length from the præbrachial transverse. Length of the body 2 lines; of the wings  $3\frac{1}{2}$  lines.

227. *DROSOPHILA ILLATA*, n. s. *Fæm.* Fulva, segmentorum abdominalium marginibus pedibusque testaceis, alis cinereis.

*Female.* Tawny; antennæ very short, 3rd joint conical, arista thinly plumose; abdomen oval, not longer than the thorax, hind borders of the segments and legs testaceous; wings grey; veins black, tawny at the base; discal transverse vein straight, upright, parted by about its length from the border, and by nearly four times its length from the præbrachial transverse. Length of the body  $1\frac{1}{4}$  line; of the wings  $2\frac{1}{2}$  lines.

228. *DROSOPHILA LURIDA*, n. s. *Mas.* Atræ, capite piceo, arista plumosa, abdomine lurido subpubescente, pedibus obscure fulvis, alis lurido-cinereis, punctis marginalibus nigris, vena transversa præbrachiali nigro nebuloza.

*Male.* Deep black; head piceous; antennæ short, 3rd joint elongate-conical, arista thinly plumose; pectus piceous; abdomen oval, lurid red, minutely pubescent, not longer than the thorax; legs dull tawny; wings lurid grey, blackish at the base, with black points at the tips of the longitudinal veins; veins yellowish; discal transverse vein straight, upright, with a black point at each end, parted by less than its length from the border, and by about twice its length from the præbrachial transverse, which is clouded with black. Length of the body 2 lines; of the wings 4 lines.

229. *DROSOPHILA LATERALIS*, n. s. *Mas.* Fulva, subtus testacea, abdomine maculis lateralibus nigris, pedibus halteribusque testaceis, alis cinereis.

*Male.* Tawny, testaceous beneath; antennæ short, 3rd joint conical, arista plumose; abdomen not longer than the thorax, with black spots along each side; legs and halteres testaceous; wings grey; veins black. Length of the body  $1\frac{1}{2}$  line; of the wings 3 lines.

#### Gen. DISCOMYZA, *Meigen*.

230. *DISCOMYZA OBSCURATA*, n. s. *Fem.* Cinereo-nigra, capite abdomineque nigris nitentibus, antennis obscure rufis, arista plumosa, pectoris lateribus albido conspersis, alis cinereis fascia informi maculaque apicali nigricantibus, halteribus albis.

*Female.* Cinereous black; head black, shining; antennæ short, dark red, 3rd joint conical, longer than the 2nd, arista thinly plumose; sides of the pectus with minute whitish speckles; abdomen elliptical, flat, black, shining, longer than the thorax; legs black; wings grey, with an irregular blackish band which does not extend to the hind border, and with a blackish apical spot; veins black; discal transverse vein straight, oblique, parted by much less than its length from the border, and by very much more than its length from the præbrachial transverse, which is clouded with black; halteres white. Length of the body 2 lines; of the wings 3 lines.

#### Gen. NOMBA, n. g.

*Mas et Fem.* *Corpus* latum, crassum. *Frons* lata. *Antennæ* brevissimæ; articulus 3<sup>us</sup> subrotundus; arista subpubescens. *Thorax* subpubescens, quasi coriaceus; scutellum parvum; metathorax maximus, abdomen alasque incumbentes obtegens. *Pedes* breves, robusti; femora subincrassata; tibiæ arcuatae. *Alæ* parvæ.

*Male and Female.* Body broad, thick, compact. Head almost as broad as the thorax; front broad, narrower than the epistoma; face vertical.

Antennæ very short; third joint nearly round; arista very minutely pubescent. Thorax solid, apparently horny, very minutely pubescent; scutellum small; metathorax elliptical, enormously developed, covering the whole abdomen, sheltering the wings when in repose. Legs short, stout; femora slightly incrassated; tibiæ curved. Wings concealed beneath the metathorax.

231. *NOMBA TECTA*, n. s. *Mas et Fæm.* Nigra, obscura, antennis piceis, tarsis flavis apice nigris, alis cinereis.

*Male and Female.* Black, dull; antennæ piceous; tarsi yellow, with black tips; wings grey; veins black. Length of the body  $1\frac{1}{2}$ – $1\frac{3}{4}$  line; of the wings  $2\frac{1}{2}$ –3 lines.

Subfam. HYDROMYZIDES, *Haliday*.

Gen. NOTIPHILA, *Fullen*.

232. *NOTIPHILA LINEOSA*, n. s. *Mas et Fæm.* Fusca, obscura, capite apud oculos linea frontali et epistomate albidis, arista plumosa, thorace lineis sex albidis, abdomine nigro segmentorum marginibus fulvis, pedibus nigris, tibiis anticis genubus tarsis halteribusque fulvis, alis cinereis.

*Male and Female.* Brown, dull; head whitish about the eyes, and with a whitish line on the front; epistoma whitish; antennæ not near reaching the epistoma, 3rd joint elongate, arista thinly plumose; thorax with six whitish lines, the lateral pair incomplete; abdomen black, not longer than the thorax, hind borders of the segments tawny; legs black, tarsi, knees, posterior tibiæ at the tips, and fore tibiæ tawny; wings grey; veins black; discal transverse vein straight, upright, parted by more than its length from the border, and by full thrice its length from the præbrachial transverse; halteres tawny. Length of the body  $1\frac{3}{4}$ –2 lines; of the wings  $3\frac{1}{2}$ –4 lines.

The two following species belong to the group of which *N. Cinerea* is the type.

233. *NOTIPHILA QUADRIFASCIA*, n. s. *Fæm.* Fusca, subtus cinerea, capite antico amplo, facie convexa, antennis nigris, arista plumosa, metathorace abdominisque maculis duabus basalibus fasciisque quatuor albidis, genubus tarsisque rufescentibus, alis cinereis puncto costali nigro, halteribus testaceis.

*Female.* Brown, cinereous beneath; head large and somewhat tumid in front and beneath; face cinereous, convex; antennæ black, very small, 3rd joint conical, arista plumose; metathorax whitish; abdomen with a whitish spot on each side at the base, and with four whitish bands, of which the 3rd and 4th are interrupted; legs cinereous black, knees and tarsi reddish; wings grey, with a black costal point at the tip of the subcostal vein; veins black; discal transverse vein oblique, nearly straight, parted by less than half its length from the

border, and by nearly thrice its length from the præbrachial transverse ; halteres testaceous. Length of the body  $2\frac{1}{2}$  lines ; of the wings 4 lines.

234. NOTIPHILA FLAVILINEA, n. s. *Mas et Fæm.* Piceo-nigra, capite apud oculos testaceo, antennis rufescentibus, arista plumosa, abdominis segmentis flavo marginatis, alis cinereis apud costam sub-luridis, halteribus testaceis.

*Male and Female.* Piceous brown ; head rather paler, testaceous about the eyes ; antennæ reddish, very short, 3rd joint conical, arista plumose ; abdomen oval, not longer than the thorax ; hind borders of the segments yellow ; wings grey, with a slight lurid tinge along the costa ; veins black ; discal transverse vein straight, upright, parted by less than its length from the border, and by a little more than twice its length from the præbrachial transverse ; halteres testaceous. Length of the body  $2\frac{1}{2}$  lines ; of the wings 4 lines.

#### Gen. EPHYDRA. *Fallen.*

235. EPHYDRA BORBOROIDES, n. s. *Fæm.* Nigra, lata, crassa, pubescens, subsetosa, antennis piceis, arista pubescente, tibiis tarsisque flavo fasciatis, alis nigricantibus latiusculis cinereseente sexguttatis.

*Female.* Black, broad, thick, somewhat pubescent and with a few bristles ; antennæ piceous, short, 3rd joint round, arista pubescent ; abdomen broader than the thorax ; legs rather setose, tibiæ and tarsi with yellow bands ; wings blackish, rather broad, with about six greyish dots on each ; veins black ; posterior longitudinal veins abbreviated ; discal transverse vein parted by more than twice its length from the border, and by less than its length from the præbrachial transverse. Length of the body  $1\frac{1}{2}$  line ; of the wings 3 lines.

236. EPHYDRA MACULICORNIS, n. s. *Mas.* Cinereo-nigra, capite antennisque rufis, his puncto nigro, arista nuda, abdomine nigro nitente, tarsis testaceis, alis cinereis apud costam pubescentibus.

*Male.* Cinereous black ; head red in front and about the eyes ; antennæ red, 3rd joint round with a black point above ; arista short, simple ; abdomen oval, black, shining, not longer than the thorax ; tarsi testaceous ; wings grey, minutely pubescent along the border ; veins black ; discal transverse vein straight, oblique, parted by more than twice its length from the border and from the præbrachial transverse ; halteres piceous. Length of the body 2 lines ; of the wings 4 lines.

#### Gen. OCHTHERA, *Latr.*

237. OCHTHERA INNOTATA, n. s. *Fæm.* Cinereo-nigra, capite antico flavescenti-albo, pectore pedibusque cinereis, abdomine cyanescenti-nigro, alis cinereis, halteribus albidis.

*Female.* Cinereous black ; head yellowish white in front, silvery white hindward ; pectus and legs cinereous ; abdomen bluish black ; wings

grey; veins black; pabrachial vein forming an obtuse angle at its junction with the discal transverse vein, the latter very oblique, parted by little more than half its length from the border, and by nearly thrice its length from the præbrachial transverse; halteres whitish. Length of the body  $2\frac{1}{2}$  lines; of the wings  $4\frac{1}{2}$  lines.

Fam. PHORIDÆ, *Haliday*.

Gen. PHORA, *Latr.*

238. PHORA BIFASCIATA, n. s. *Fem.* Atra, subtus flavescenti-alba, antennis fulvis, abdomine lanceolato, fasciis duabus apice pedibus halteribusque flavescenti-albis, pedibus posticis nigris basi flavescenti-albis, tarsis intermediis nigricantibus, alis cinereis.

*Female.* Deep black, yellowish white beneath; antennæ tawny; abdomen lanceolate, much longer than the thorax; sides elevated, a broad basal yellowish white band, and a narrower one beyond the middle, tip also yellowish white; anterior legs and halteres yellowish white, middle tarsi blackish, hind femora with the basal half yellowish white; wings cinereous, veins black, pale at the base; costal vein ending at a little beyond half the length of the wing; radial cubital, præbrachial, and pabrachial veins parallel and equally distinct. Length of the body 2– $2\frac{1}{2}$  lines; of the wings 5–6 lines.

On the Zoological Geography of the Malay Archipelago. By ALFRED R. WALLACE, Esq. Communicated by CHARLES DARWIN, Esq., F.R.S. & L.S.

[Read Nov. 3rd, 1859.]

IN Mr. Selater's paper on the Geographical Distribution of Birds, read before the Linnean Society, and published in the 'Proceedings' for February 1858, he has pointed out that the western islands of the Archipelago belong to the Indian, and the eastern to the Australian region of Ornithology. My researches in these countries lead me to believe that the same division will hold good in every branch of Zoology; and the object of my present communication is to mark out the precise limits of each region, and to call attention to some inferences of great general importance as regards the study of the laws of organic distribution.

The Australian and Indian regions of Zoology are very strongly contrasted. In one the Marsupial order constitutes the great mass of the mammalia,—in the other not a solitary marsupial animal exists. Marsupials of at least two genera (*Cuscus* and *Belideus*) are found all over the Moluccas and in Celebes; but none have



been detected in the adjacent islands of Java and Borneo. Of all the varied forms of *Quadrumanæ*, *Carnivora*, *Insectivora* and *Ruminantia* which abound in the western half of the Archipelago, the only genera found in the Moluccas are *Paradoxurus* and *Cervus*. The *Sciuridæ*, so numerous in the western islands, are represented in Celebes by only two or three species, while not one is found further east. Birds furnish equally remarkable illustrations. The Australian region is the richest in the world in Parrots; the Asiatic is (of tropical regions) the poorest. Three entire families of the Psittacine order are peculiar to the former region, and two of them, the Cockatoos and the Lories, extend up to its extreme limits, without a solitary species passing into the Indian islands of the Archipelago. The genus *Palæornis* is, on the other hand, confined with equal strictness to the Indian region. In the Rasorial order, the *Phasianidæ* are Indian, the *Megapodiidæ* Australian; but in this case one species of each family just passes the limits into the adjacent region. The genus *Tropidorrhynchus*, highly characteristic of the Australian region, and everywhere abundant as well in the Moluccas and New Guinea as in Australia, is quite unknown in Java and Borneo. On the other hand, the entire families of *Bucconidæ*, *Trogonidæ* and *Phyllornithidæ*, and the genera *Pericrocotus*, *Picnonotus*, *Trichophorus*, *Ixos*, in fact, almost all the vast family of Thrushes and a host of other genera, cease abruptly at the eastern side of Borneo, Java, and Bali. All these groups are *common birds* in the great Indian islands; they abound everywhere; they are the characteristic features of the ornithology; and it is most striking to a naturalist, on passing the narrow straits of Macassar and Lombock, suddenly to miss them entirely, together with the *Quadrumanæ* and *Felidæ*, the *Insectivora* and *Rodentia*, whose varied species people the forests of Sumatra, Java, and Borneo.

To define exactly the limits of the two regions where they are (geographically) most intimately connected, I may mention that during a few days' stay in the island of Bali I found birds of the genera *Copsychus*, *Megalaima*, *Tiga*, *Ploccus*, and *Sturnopastor*, all characteristic of the Indian region and abundant in Malacca, Java, and Borneo; while on crossing over to Lombock, during three months collecting there, not one of them was ever seen; neither have they occurred in Celebes nor in any of the more eastern islands I have visited. Taking this in connexion with the fact of *Cacatua*, *Tropidorrhynchus*, and *Megapodius* having their western limit in Lombock, we may consider it established that the Strait of Lombock

(only 15 miles wide) marks the limits and abruptly separates two of the great Zoological regions of the globe. The Philippine Islands are in some respects of doubtful location, resembling and differing from both regions. They are deficient in the varied Mammals of Borneo, but they contain no Marsupials. The Psittaci are scarce, as in the Indian region; the Lories are altogether absent, but there is one representative of the Cockatoos. Woodpeckers, Trogons, and the genera *Ixos*, *Copsychus*, and *Ploceus* are highly characteristic of India. *Tanysiptera* and *Megapodius*, again, are Australian forms, but these seem represented by only solitary species. The islands possess also a few peculiar genera. We must on the whole place the Philippine Islands in the Indian region, but with the remark that they are deficient in some of its most striking features. They possess several isolated forms of the Australian region, but by no means sufficient to constitute a real transition thereto.

Leaving the Philippines out of the question for the present, the western and eastern islands of the Archipelago, as here divided, belong to regions more distinct and contrasted than any other of the great zoological divisions of the globe. South America and Africa, separated by the Atlantic, do not differ so widely as Asia and Australia: Asia with its abundance and variety of large Mammals and no Marsupials, and Australia with scarcely anything but Marsupials; Asia with its gorgeous *Phasianidæ*, Australia with its dull-coloured *Megapodiidæ*; Asia the poorest tropical region in Parrots, Australia the richest: and all these striking characteristics are almost unimpaired at the very limits of their respective districts; so that in a few hours we may experience an amount of zoological difference which only weeks or even months of travel will give us in any other part of the world!

Moreover there is nothing in the aspect or physical character of the islands to lead us to expect such a difference; their physical and geological differences do not coincide with the zoological differences. There is a striking homogeneity in the two *halves* of the Archipelago. The great volcanic chain runs through both parts; Borneo is the counterpart of New Guinea; the Philippines closely resemble the equally fertile and equally volcanic Moluccas; while in eastern Java begins to be felt the more arid climate of Timor and Australia. But these resemblances are accompanied by an extreme zoological diversity, the Asiatic and Australian regions finding in Borneo and New Guinea respectively their highest development.

But it may be said: "The separation between these two regions is not so absolute. There *is* some transition. There *are* species and genera common to the eastern and western islands." This is true, yet (in my opinion) proves no transition in the proper sense of the word; and the nature and amount of the resemblance only shows more strongly the absolute and original distinctness of the two divisions. The exception here clearly proves the rule.

Let us investigate these cases of supposed transition. In the western islands almost the only instance of a group peculiar to Australia and the eastern islands is the *Megapodius* in North-west Borneo. Not one of the Australian forms of Mammalia passes the limits of the region. On the other hand, *Quadrupana* occur in Celebes, Batchian, Lombock, and perhaps Timor; Deer have reached Celebes, Timor, Buru, Ceram, and Gilolo, but not New Guinea; Pigs have extended to New Guinea, probably the true eastern limit of the genus *Sus*; Squirrels are found in Celebes, Lombock, and Sumbawa: among birds, *Gallus* occurs in Celebes and Sumbawa, Woodpeckers reach Celebes, and Hornbills extend to the North-west of New Guinea. These cases of identity or resemblance in the animals of the two regions we may group into three classes; 1st, identical species; 2nd, closely allied or representative species; and 3rd, species of peculiar and isolated genera. The common Grey Monkey (*Macacus cynomolgus*) has reached Lombock, and perhaps Timor, but not Celebes. The Deer of the Moluccas seems to be a variety of the *Cervus rufus* of Java and Borneo. The Jungle Cock of Celebes and Lombock is a Javanese species. *Hirundo javanica*, *Zosterops flavus*, *Halcyon collaris*, *Eurystomus gularis*, *Macropygia phasianella*, *Merops javanicus*, *Anthreptes lepida*, *Ptilonopus melanocephala*, and some other birds appear the same in the adjacent islands of the eastern and western divisions, and some of them range over the whole Archipelago. But after reading Lyell on the various modes of dispersion of animals, and looking at the proximity of the islands, we shall feel astonished, not at such an amount of interchange of species (most of which are birds of great powers of flight), but rather that in the course of ages a much greater and almost complete fusion has not taken place. Were the Atlantic gradually to narrow till only a strait of twenty miles separated Africa from South America, can we help believing that many birds and insects and some few mammals would soon be interchanged? But such interchange would be a fortuitous mixture of faunas essentially and absolutely dissimilar, not a natural and regular transition from

one to the other. In like manner the cases of identical species in the eastern and western islands of the Archipelago are due to the gradual and accidental commingling of originally absolutely distinct faunas.

In our second class (representative species) we must place the Wild Pigs, which seem to be of distinct but closely allied species in each island; the Squirrels also of Celebes are of peculiar species, as are the Woodpeckers and Hornbills, and two Celebes birds of the Asiatic genera *Phenicophæus* and *Acridotheres*. Now these and a few more of like character are closely allied to other species inhabiting Java, Borneo, or the Philippines. We have only therefore to suppose that the species of the western passed over to the eastern islands at so remote a period as on one side or the other to have become extinct, and to have been replaced by an allied form, and we shall have produced exactly the state of things now existing. Such extinction and such replacement we know has been continually going on. Such has been the regular course of nature for countless ages in every part of the earth of which we have geological records; and unless we are prepared to show that the Indo-Australian Archipelago was an altogether exceptional region, such must have been the course of nature here also. If these islands have existed in their present form only during one of the later divisions of the Tertiary period, and if interchange of species at very rare and distant intervals has occurred, then the fact of some identical and other closely allied species is a necessary result, even if the two regions in question had been originally peopled by absolutely distinct creations of organic beings, and there had never been any closer connexion between them than now exists. The occurrence of a limited number of representative species in the two divisions of the Archipelago does not therefore prove any true transition from one to the other.

The examples of our third class—of peculiar genera having little or no affinity with those of the adjacent islands—are almost entirely confined to Celebes, and render that island a district *per se*, in the highest degree interesting. *Cynopithecus*, a genus of Baboons, the extraordinary Babirusa and the singular ruminant *Ansa depressicornis* have nothing in common with Asiatic mammals, but seem more allied to those of Africa. A quadrumanous animal of the same genus (perhaps identical) occurs in the little island of Batchian, which forms the extreme eastern limit of the highest order of mammalia. An allied species is also said to exist in the Philippines. Now this occurrence of quadrumana in the Australian

region proves nothing whatever as regards a transition to the western islands, which, among their numerous monkeys and apes, have nothing at all resembling them. The species of Celebes and Batchian have the high superorbital ridge, the long nasal bone, the dog-like figure, the minute erect tail, the predaceous habits and the fearless disposition of the true Baboons, and find their allies nowhere nearer than in tropical Africa. The *Anoa* seems also to point towards the same region, so rich in varied forms of Antelopes.

In the class of birds, Celebes possesses a peculiar genus of Parrots (*Prioniturus*), said to occur also in the Philippines; *Meropogon*, intermediate between an Indian and an African form of Bee-eaters; and the anomalous *Scissirostrum*, which Prince Bonaparte places next to a Madagascar bird, and forms a distinct subfamily for the reception of the two. Celebes also contains a species of *Coracias*, which is here quite out of its normal area, the genus being otherwise confined to Africa and continental India, not occurring in any other part of the Archipelago. The Celebes bird is placed, in Bonaparte's 'Conspetus,' between two African species, to which therefore I presume it is more nearly allied than to those of India. Having just received Mr. Smith's Catalogue of the Hymenoptera collected during my first residence in Celebes, I find in it some facts of an equally singular nature. Of 103 species, only 16 are known to inhabit any of the western islands of the Archipelago, while 18 are identical with species of continental India, China, and the Philippine Islands, two are stated to be identical with insects hitherto known only from tropical Africa, and another is said to be most closely allied to one from the Cape.

These phenomena of distribution are, I believe, the most anomalous yet known, and in fact altogether unique. I am aware of no other spot upon the earth which contains a number of species, in several distinct classes of animals, the nearest allies to which do not exist in any of the countries which on every side surround it, but which are to be found only in another primary division of the globe, separated from them all by a vast expanse of ocean. In no other case are the species of a genus or the genera of a family distributed in *two* distinct areas separated by countries in which they do not exist; so that it has come to be considered a law in geographical distribution, "that both species and groups inhabit continuous areas."

Facts such as these can only be explained by a bold acceptance of vast changes in the surface of the earth. They teach us that this island of Celebes is more ancient than most of the islands

now surrounding it, and obtained some part of its fauna before they came into existence. They point to the time when a great continent occupied a portion at least of what is now the Indian Ocean, of which the islands of Mauritius, Bourbon, &c. may be fragments, while the Chagos Bank and the Keeling Atolls indicate its former extension eastward to the vicinity of what is now the Malayan Archipelago. The Celebes group remains the last eastern fragment of this now submerged land, or of some of its adjacent islands, indicating its peculiar origin by its zoological isolation, and by still retaining a marked affinity with the African fauna.

The great Pacific continent, of which Australia and New Guinea are no doubt fragments, probably existed at a much earlier period, and extended as far westward as the Moluccas. The extension of Asia as far to the south and east as the Straits of Macassar and Lomboek must have occurred subsequent to the submergence of both these great southern continents; and the breaking up and separation of the islands of Sumatra, Java, and Borneo has been the last great geological change these regions have undergone. That this has really taken place as here indicated, we think is proved by the following considerations. Not more than twenty (probably a smaller number) out of about one hundred land birds of Celebes at present known are found in Java or Borneo, and only one or two of twelve or fifteen Mammalia. Of the Mammalia and birds of Borneo, however, at least three-fourths, probably five-sixths, inhabit also Java, Sumatra, or the peninsula of Malacca. Now, looking at the direction of the Macassar Straits running nearly north and south, and remembering we are in the district of the monsoons, a steady south-east and north-west wind blowing alternately for about six months each, we shall at once see that Celebes is more favourably situated than any other island to receive stray passengers from Borneo, whether drifted across the sea or wafted through the air. The distance too is less than between any of the other large islands; there are no violent currents to neutralize the action of the winds; and numerous islets in mid-channel offer stations which might rescue many of the wanderers, and admit, after repose, of fresh migrations. Between Java and Borneo the width of sea is much greater, the intermediate islands are fewer, and the direction of the monsoons *along* and not *across* the Java sea, accompanied by alternating currents in the same direction, must render accidental communication between the two islands exceedingly difficult; so that where the facilities for intercommunication are greatest, the number of species common to the two

countries is least, and *vice versâ*. But again, the mass of the species of Borneo, Java, &c., even when not *identical* are *congeneric*, which, as before explained, indicates *identity* at an earlier epoch; whereas the great mass of the fauna of Celebes is widely different from that of the western islands, consisting mostly of genera, and even of entire families, altogether foreign to them. This clearly points to a former total diversity of forms and species,—existing similarities being the result of intermixture, the extreme facilities for which we have pointed out. In the case of the great western islands a former more complete identity is indicated, the present differences having arisen from their isolation during a considerable period, allowing time for that partial extinction and introduction of species which is the regular course of nature. If the very small number of western species in Celebes is all that the most favourable conditions for transmission could bring about, the complete similarity of the faunas of the western islands could never (with far less favourable conditions) have been produced by the same means. And what other means can we conceive but the former connexion of those islands with each other and with the continent of Asia?

In striking confirmation of this view we have physical evidence of a very interesting nature. These countries are in fact *still connected*, and that so completely that an elevation of only 300 feet would nearly double the extent of tropical Asia. Over the whole of the Java Sea, the Straits of Malacca, the Gulf of Siam, and the southern part of the China Sea, ships can anchor in less than fifty fathoms. A vast submarine plain unites together the apparently disjointed parts of the Indian zoological region, and abruptly terminates, exactly at its limits, in an unfathomable ocean. The deep sea of the Moluccas comes up to the very coasts of Northern Borneo, to the Strait of Lomboek in the south, and to near the middle of the Strait of Macassar. May we not therefore from these facts very fairly conclude that, according to the system of alternate bands of elevation and depression that seems very generally to prevail, the last great rising movement of the volcanic range of Java and Sumatra was accompanied by the depression that now separates them from Borneo and from the continent?

It is worthy of remark that the various islands of the Moluccas, though generally divided by a less extent of sea, have fewer species in common; but the separating seas are in almost every case of immense depth, indicating that the separation took place at a much earlier period. The same principle is well illustrated by the dis-

tribution of the genus *Paradisca*, two species of which (the common Birds of Paradise) are found only in New Guinea and the islands of Aru, Mysol, Waigiou, and Jobie, all of which are connected with New Guinea by banks of soundings, while they do not extend to Ceram or the Ké Islands, which are no further from New Guinea, but are separated from it by deep sea. Again, the chain of small volcanic islands to the west of Gilolo, though divided by channels of only ten or fifteen miles wide, possess many distinct representative species of insects, and even, in some cases, of birds also. The Baboons of Batchian have not passed to Gilolo, a much larger island, only separated from it by a channel ten miles wide, and in one part almost blocked up with small islands.

Now looking at these phenomena of distribution, and especially at those presented by the fauna of Celebes, it appears to me that a much exaggerated effect, in producing the present distribution of animals, has been imputed to the accidental transmission of individuals across intervening seas; for we have here as it were a test or standard by which we may measure the possible effect due to these causes, and we find that, under conditions perhaps the most favourable that exist on the globe, the percentage of species derived from this source is extremely small. When my researches in the Archipelago are completed, I hope to be able to determine with some accuracy this numerical proportion in several cases; but in the mean time we will consider 20 per cent. as the probable maximum for birds and mammals which in Celebes have been derived from Borneo or Java.

Let us now apply this standard to the case of Great Britain and the Continent, in which the width of dividing sea and the extent of opposing coasts are nearly the same, but in which the species are almost all identical,—or to Ireland, more than 90 per cent. of whose species are British,—and we shall at once see that no theory of transmission across the present Straits is admissible, and shall be compelled to resort to the idea of a very recent separation (long since admitted), to account for these zoological phenomena.

It is, however, to the oceanic islands that we consider the application of this test of the most importance. Let any one try to realize the comparative facilities for the transmission of organized beings across the Strait of Macassar from Borneo to Celebes, and from South Europe or North Africa to the island of Madeira, at least four times the distance, and a mere point in the ocean, and he would probably consider that in a given period a hundred cases of transmission would be more likely to occur in the former case



than one in the latter. Yet of the comparatively rich insect-fauna of Madeira, 40 per cent. are continental species ; and of the flowering plants more than 60 per cent. The Canary Islands offer nearly similar results. Nothing but a former connexion with the Continent will explain such an amount of specific identity (the weight of which will be very much increased if we take into account the representative species) ; and the direction of the Atlas range towards Teneriffe, and of the Sierra Nevada towards Madeira, are material indications of such a connexion.

The Galapagos are no further from South America than Madeira is from Europe, and, being of greater extent, are far more liable to receive chance immigrants ; yet they have hardly a species identical with any inhabiting the American continent. These islands therefore may well have originated in mid-ocean ; or if they ever were connected with the mainland, it was at so distant a period that the natural extinction and renewal of species has left not one in common. The character of their fauna, however, is more what we should expect to arise from the chance introduction of a very few species at distant intervals ; it is very poor ; it contains but few genera, and those scattered among unconnected families ; its genera often contain several closely allied species, indicating a single antitype.

The fauna and flora of Madeira and of the Canaries, on the other hand, have none of this chance character. They are comparatively rich in genera and species ; most of the principal groups and families are more or less represented ; and, in fact, these islands do not differ materially, as to the general character of their animal and vegetable productions, from any isolated mountain in Europe or North Africa of about equal extent.

On exactly the same principles, the very large number of species of plants, insects, and birds, in Europe and North America, either absolutely identical or represented by very closely allied species, most assuredly indicates that some means of land communication in temperate or sub-arctic latitudes existed at no very distant geological epoch ; and though many naturalists are inclined to regard all such views as vague and unprofitable speculations, we are convinced they will soon take their place among the legitimate deductions of science.

Geology can detect but a portion of the changes the surface of the earth has undergone. It can reveal the past history and mutations of what is now dry land ; but the ocean tells nothing of her bygone history. Zoology and Botany here come to the aid of

their sister science, and by means of the humble weeds and despised insects inhabiting its now distant shores, can discover some of those past changes which the ocean itself refuses to reveal. They can indicate, approximately at least, where and at what period former continents must have existed, from what countries islands must have been separated, and at how distant an epoch the rupture took place. By the invaluable indications which Mr. Darwin has deduced from the structure of coral reefs, by the surveys of the ocean-bed now in progress, and by a more extensive and detailed knowledge of the geographical distribution of animals and plants, the naturalist may soon hope to obtain some idea of the continents which have now disappeared beneath the ocean, and of the general distribution of land and sea at former geological epochs.

Most writers on geographical distribution have completely overlooked its connexion with well-established geological facts, and have thereby created difficulties where none exist. The peculiar and apparently endemic faunæ and floræ of the oceanic islands (such as the Galapagos and St. Helena) have been dwelt upon as something anomalous and inexplicable. It has been imagined that the more simple condition of such islands would be to have their productions identical with those of the nearest land, and that their actual condition is an incomprehensible mystery. The very reverse of this is however the case. We really require no speculative hypothesis, no new theory, to explain these phenomena; they are the logical results of well-known laws of nature. The regular and unceasing extinction of species, and their replacement by allied forms, is now no hypothesis, but an established fact; and it necessarily produces such peculiar faunæ and floræ in all but recently formed or newly disrupted islands, subject of course to more or less modification according to the facilities for the transmission of fresh species from adjacent continents. Such phenomena therefore are far from uncommon. Madagascar, Mauritius, the Moluccas, New Zealand, New Caledonia, the Pacific Islands, Juan Fernandez, the West India Islands, and many others, all present such peculiarities in greater or less development. It is the instances of identity of species in distant countries that presents the real difficulty. What was supposed to be the more normal state of things is really exceptional, and requires some hypothesis for its explanation. The phenomena of distribution in the Malay Archipelago, to which I have here called attention, teach us that, however narrow may be the strait separating an island from its con-

continent, it is still an impassable barrier against the passage of any considerable number and variety of land animals; and that in all cases in which such islands possess a tolerably rich and varied fauna of species mostly identical, or closely allied with those of the adjacent country, we are forced to the conclusion that a geologically recent disruption has taken place. Great Britain, Ireland, Sicily, Sumatra, Java and Borneo, the Aru Islands, the Canaries and Madeira, are cases to which the reasoning is fully applicable.

In his introductory Essay on the Flora of New Zealand, Dr. Hooker has most convincingly applied this principle to show the former connexion of New Zealand and other southern islands with the southern extremity of America; and I will take this opportunity of calling the attention of zoologists to the very satisfactory manner in which this view clears away many difficulties in the distribution of animals. The most obvious of these is the occurrence of Marsupials in America only, beyond the Australian region. They evidently entered by the same route as the plants of New Zealand and Tasmania which occur in South temperate America, but having greater powers of dispersion, a greater plasticity of organization, have extended themselves over the whole continent though with so few modifications of form and structure as to point to a unity of origin at a comparatively recent period. It is among insects, however, that the resemblances approach in number and degree to those exhibited by plants. Among Butterflies the beautiful *Heliconidæ* are strictly confined to South America, with the exception of a single genus (*Hamadryas*) found in the Australian region from New Zealand to New Guinea. In Coleoptera many families and genera are characteristic of the two countries; such are *Pseudomorphidæ* among the Geodephaga, *Lamprimidæ* and *Syndesidæ* among the Lucani, *Anoplognathidæ* among the Lamellicornes, *Stigmoderidæ* among the Buprestes, *Natalis* among the Cleridæ, besides a great number of representative genera. This peculiar distribution has hitherto only excited astonishment, and has confounded all ideas of unity in the distribution of organic beings; but we now see that they are in exact accordance with the phenomena presented by the flora of the same regions, as developed in the greatest detail by the researches of Dr. Hooker.

It is somewhat singular, however, that not one *identical species* of insect should yet have been discovered, while no less than 89 species of flowering plants are found both in New Zealand and South America. The relations of the animals and of the plants

of these countries must necessarily depend on the same physical changes which the Southern hemisphere has undergone; and we are therefore led to conclude that insects are much less persistent in their specific forms than flowering plants, while among Mammalia and land birds (in which no genus even is common to the countries in question) species must die and be replaced much more rapidly than in either. And this is exactly in accordance with the fact (well established by geology) that at a time when the shells of the European seas were almost all identical with species now living, the European Mammalia were almost all different. The duration of life of species would seem to be in an inverse proportion to their complexity of organization and vital activity.

In the brief sketch I have now given of this interesting subject, such obvious and striking facts alone have been adduced as a traveller's note-book can supply. The argument must therefore lose much of its weight from the absence of detail and accumulated examples. There is, however, such a very general accordance in the phenomena of distribution as separately deduced from the various classes or kingdoms of the organic world, that whenever one class of animals or plants exhibits in a clearly marked manner certain relations between two countries, the other classes will certainly show similar ones, though it may be in a greater or a less degree. Birds and insects will teach us the same truths; and even animals and plants, though existing under such different conditions, and multiplied and dispersed by such a generally distinct process, will never give conflicting testimony, however much they may differ as regards the amount of relationship between distant regions indicated by them, and consequently notwithstanding the greater or less weight either may have in the determining of questions of this nature.

This is my apology for offering to the Linnean Society the present imperfect outline in anticipation of the more detailed proofs and illustrations which I hope to bring forward on a future occasion.

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